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ABSTRACT

Among the 36 research papers and critiques are "A Comparison of 1972 and 1980 Secondary Agricultural Education Students" (Navaratnam, Oliver); "A Day Late and a Dollar Short" (Moore); "Assessment of Preservice Preparation by Recent Graduates of Agricultural Education Programs" (Yahya, Burnett); "Characteristics and Activities of Vocational Agriculture Teachers and FFA Chapters Related to Participation in Community Development" (Malpiedi, Voth); "Current Status of Women Teachers of Vocational Agriculture in Ohio and Their Perceptions of Their Place in the Profession" (Knight); "Educational Strategies and Extent of Cooperation with Agri-Educators by Selected Agribusinesses" (Ubadigbo, Gamon); "Effectiveness of Two Instructional Modes for Teaching Vocational Agriculture Students of Differing Learning Styles" (Howard, Yoder) "Effect of Feedback on Selected Teaching Behaviors of Agriculture Teacher Educators" (Woodley, Kotrlik); "Employers' Perceptions of Technical and Nontechnical Skills Needed by Horticultural Employees" (O'Neal, Henderson); "Factors Associated with Preferred Learning Styles of Vocational Agriculture Students" (Cox et al.); "How Do They Compare? The Opinions of Vocational Agriculture Teachers toward State Supervision and Teacher Education in Agriculture" (Lelle, Kotrlik); "Identification of Science-Related Competencies Taught in Vocational Agriculture Programs" (Moss); "Mathematical Problem-Solving Skills in Agricultural Mechanics of Undergraduate Students" (Gliem et al.); "Mathematical Problem-Solving Skills of High School Vocational Agriculture Teachers and Students" (Persinger, Gliem); "Microcomputers and Instruction" (Ogle); "Opinions of School Administrators Regarding Selected Aspects of Vocational Agriculture Programs" (Jewell); "Pedagogical Inservice Needs and Activities of Postsecondary Agriculture Instructors" (Harmon, Mortensen); "Perceptions of Vocational Agriculture Students and Teachers about the Role of Vocational Agriculture in Rural Schools" (McCracken); "SOE Programs in Illinois" (Osborne); "Teacher Presage Variables and Quality Supervised Occupational Experience" (Makin, Miller); "The College Preparatory Curriculum and Academic Performance in College" (Warmbrod, Doerfert); "The Effect of Participation in Secondary Vocational Agriculture on Success in Postsecondary Education" (Rudolph, Yoder); "The Evolution of the Problem-Solving Approach in Agricultural Education" (Lass, Moss); "Video-Simulation as a Computer Applications Instructional Technique for Agricultural Professionals and Students" (Atherton, Buriak); "Assessment of Three Microcomputer Teaching Strategies in Vocational Agriculture" (Birkenholz et al.); and "Job Satisfaction of 4-H Agents of the Cooperative Extension Service" (Marshall, Burnett). (YLB)

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RESEARCH IN AGRICULTURAL EDUCATION

ATTAINING EXCELLENCE IN THE 80'S

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PROCEEDINGS OF THE FOURTEENTH ANNUAL NATIONAL AGRICULTURAL EDUCATION RESEARCH MEETING

DECEMBER 4, 1987
LAS VEGAS HILTON
LAS VEGAS, NEVADA

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RESEARCH IN AGRICULTURAL EDUCATION

ATTAINING EXCELLENCE IN THE 80's

Proceedings
Compiled and Edited
by
Alfred J. Mannebach
Chairperson
Fourteenth Annual National
Agricultural Education Research Meeting
and
Professor
Department of Educational Leadership
School of Education
University of Connecticut
Storrs, Connecticut 06268

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Las Vegas, Nevada

TABLE OF CONTENTS

Page

Preface x

Acknowledgments xii

National Agricultural Education Research Meeting -
Paper Proposal Evaluation Form xv

Outstanding Research Paper Presentation Award Rating Form xvi

Papers Presented

A comparison of 1972 and 1980 Secondary Agricultural Education Students.......... 1
K.K. Navaratnam and J. Dale Oliver, Virginia Tech

A Comparison of 1972 and 1980 Secondary Agricultural Education Students--A Critique.......... 9
Dennis Scanlon, The Pennsylvania State University

A Day Late and A Dollar Short: Doctoral Research in Agricultural Education.......... 10
Gary E. Moore, Louisiana State University

A Day Late and A Dollar Short: Doctoral Research in Agricultural Education--A Critique.......... 18
Alan A. Kahler, Iowa State University

A Descriptive Study of Vocational Agriculture Teachers and the Degrees To Which They Have Adopted Research Validated Teaching Behaviors.......... 19
L. DeVere Burton, Idaho State University and
Alan A. Kahler, Iowa State University

A Descriptive Study of Vocational Agriculture Teachers and the Degrees To Which They Have Adopted Research Validated Teaching Behaviors--A Critique.......... 27
Philip Buriak, Mississippi State University

Agribusiness Skills Required by Secondary Vocational Agriculture Students as Preceived by Nebraska Vocational Agriculture Instructors and Agribusiness Managers.......... 28
David R. Spotanski, Iowa State University and
Richard M. Foster, University of Nebraska

Agribusiness Skills Required by Secondary Vocational Agriculture Students as Preceived by Nebraska Vocational Agriculture Instructors and Agribusiness Managers--A Critique..... 36
John Hillison, Virginia Tech

A Profile of Women Agricultural Scientists in U.S. Land-Grant Universities.. 37
Janet L. Henderson and Barbara E. Cooper, The Ohio State University

A Profile of Women Agricultural Scientists in U.S. Land-Grant Universities--A Critique.............................. 43
Jeffrey W. Moss, Louisiana State University

Assessment of Preservice Preparation by Recent Graduates of Agricultural Education Programs.............................. 44
Ismail bin Yahya and Michael F. Burnett, Louisiana State University

Assessment of Preservice Preparation by Recent Graduates of Agricultural Education Programs--A Critique.................... 52
Alan A. Kahler, Iowa State University

Attitudes of Nebraska Superintendents, Principals, and Vocational Agriculture Instructors Regarding the Delivery of Adult Education Through Secondary Vocational Agriculture Programs.. 53
Michael F. Adelaine and Richard M. Foster, University of Nebraska

Attitudes of Nebraska Superintendents, Principals, and Vocational Agriculture Instructors Regarding the Delivery of Adult Education Through Secondary Vocational Agriculture Programs--A Critique.. 61
Martin McMillion, Virginia Tech

Attitudes of Selected Policy Makers Toward Agriculture........... 62
Leon G. Schumacher, University of Missouri and Alan A. Kahler, Iowa State University

Attitudes of Selected Policy Makers Toward Agriculture--A Critique.. 70
Frank Bobbitt, Michigan State University

Characteristics and Activities of Vocational Agriculture Teachers and FFA Chapters Related to Participation in Community Development.. 71
Barbara J. Malpiedi, North Carolina State University and Donald E. Voth, University of Arkansas

Characteristics and Activities of Vocational Agriculture Teachers and FFA Chapters Related to Participation in Community Development--A Critique.............................. 79
Larry Miller, The Ohio State University

Current Status of Women Teachers of Vocational Agriculture in Ohio and Their Perceptions of Their Place in the Profession.... 80
James A. Knight, The Ohio State University

Current Status of Women Teachers of Vocational Agriculture in Ohio and Their Perceptions of Their Place in the Profession--A Critique........ 85
Jeffrey W. Moss, Louisiana State University

Discriminate Values of Professional and Community Leadership Activities of Vocational Agriculture Teachers As They Relate to Teacher Use of Effective Teaching Practices........ 86
L. DeVere Burton, Idaho State University and
Alan A. Kahler, Iowa State University

Discriminate Values of Professional and Community Leadership Activities of Vocational Agriculture Teachers As They Relate to Teacher Use of Effective Teaching Practices--A Critique........ 94
Edward W. Osborne, University of Illinois

Educational Strategies and Extent of Cooperation with Agri-Educators by Selected Agribusinesses........ 95
Fidelis N. Ubadigbo and Julia A. Gamon,
Iowa State University

Educational Strategies and Extent of Cooperation with Agri-Educators by Selected Agribusinesses--A Critique........ 103
Larry Miller, The Ohio State University

Effectiveness of Two Instructional Modes for Teaching Vocational Agriculture Students of Differing Learning Styles........ 104
James M. Howard and Edgar P. Yoder,
The Pennsylvania State University

Effectiveness of Two Instructional Modes for Teaching Vocational Agriculture Students of Differing Learning Styles--A Critique........ 111
L.H. Newcomb, The Ohio State University

Effect of Feedback on Selected Teaching Behaviors of Agriculture Teacher Educators........ 112
Steve Woodley, Stephen F. Austin, State University
and Joe W. Kotrlik, Louisiana State University

Effect of Feedback on Selected Teaching Behaviors of Agriculture Teacher Educators--A Critique........ 120
Philip Buriak, Mississippi State University

Employers' Preceptions of Technical and Non-Technical Skills Needed by Horticultural Employees........ 121
Steve O'Neal and Janet L. Henderson,
The Ohio State University

Employers' Preceptions of Technical and Non-Technical Skills Needed by Horticultural Employees--A Critique........ 128
John Hillison, Virginia Tech

Factors Associated With Preferred Learning Styles of Vocational Agriculture Students 129
David E. Cox, Elizabeth Kendall Sproles and George B. Sproles, University of Arizona

Factors Associated With Preferred Learning Styles of Vocational Agriculture Students--A Critique 137
L.H. Newcomb, The Ohio State University

Factors Contributing to Hearing Loss Among Teachers of Agricultural Mechanics 138
Stanley R. Burke, Virginia Tech

Factors Contributing to Hearing Loss Among Teachers of Agricultural Mechanics--A Critique 146
George Wardlow, University of Minnesota

Forecasting Emerging Knowledge and Skills for Part-Time Agriculture 147
Everett W. Harris and Charles W. Nardozzi, The University of Vermont

Forecasting Emerging Knowledge and Skills for Part-Time Agriculture--A Critique 155
John Hillison, Virginia Tech

How Do They Compare? The Opinions of Vocational Agriculture Teachers Toward State Supervision and Teacher Education in Agriculture 156
Joe Kotrlik and Mark A. Lelle, Louisiana State University

How Do They Compare? The Opinions of Vocational Agriculture Teachers Toward State Supervision and Teacher Education in Agriculture--A Critique 163
Larry Miller, The Ohio State University

Identification of Science-Related Competencies Taught in Vocational Agriculture Programs 164
Jeffrey W. Moss, Louisiana State University

Identification of Science-Related Competencies Taught in Vocational Agriculture Programs--A Critique 172
L.H. Newcomb, The Ohio State University

Impact of Federal Development Programs on Agricultural Production Under Monitored Educational and Technological Condition Within The Ejido System in Chihuahua, Mexico 173
Jose Luis Alba-Rojo and James P. Key, Oklahoma State University

Impact of Federal Development Programs on Agricultural Production Under Monitored Educational and Technological Condition Within The Ejido System in Chihuahua, Mexico--A Critique.......... 181
Jeffrey W. Moss, Louisiana State University

Levels of Cognition of Tests and Assignments in Agricultural Courses at The Ohio State University.......... 182
L.H. Newcomb and Marilyn K. Traefz, The Ohio State University

Levels of Cognition of Tests and Assignments in Agricultural Courses at The Ohio State University--A Critique.......... 190
Stacy A. Gartin, West Virginia University

Mathematical Problem-Solving Skills in Agricultural Mechanics of Undergraduate Students.......... 191
Joe A. Gliem, Michael J. Lichtensteiger, and David L. Hard, The Ohio State University

Mathematical Problem-Solving Skills in Agricultural Mechanics of Undergraduate Students--A Critique.......... 199
Martin McMillion, Virginia Tech

Mathematical Problem-Solving Skills of High School Vocational Agriculture Teachers and Students.......... 200
Kevin M. Persinger and Joe A. Gleim, The Ohio State University

Mathematical Problem-Solving Skills of High School Vocational Agriculture Teachers and Students--A Critique.......... 208
Martin McMillion, Virginia Tech

Microcomputers and Instruction: Using a Drill and Practice Approach.......... 209
Thomas D. Ogle, Robert J. Birkenholz and Bob R. Stewart, University of Missouri-Columbia

Microcomputers and Instruction: Using a Drill and Practice Approach--A Critique.......... 216
Edward Osborne, University of Illinois

Opinions of School Administrators Regarding Selected Aspects of Vocational Agriculture Programs.......... 217
Larry R. Jewell, North Carolina State University

Opinions of School Administrators Regarding Selected Aspects of Vocational Agriculture Programs--A Critique.......... 225
Frank Bobbitt, Michigan State University

Pedagogical Inservice Needs and Activities of Postsecondary Agriculture Instructors.......... 226
Hobart L. Harmon, University of Illinois and James H. Mortensen, The Pennsylvania State University

Pedagogical Inservice Needs and Activities of Postsecondary Agriculture Instructors--A Critique................. 234
Stacy A. Gartin, West Virginia University

Perceptions of Vocational Agriculture Students and Teachers About the Role of Vocational Agriculture in Rural Schools......... 235
J. David McCracken, The Ohio State University

Perceptions of Vocational Agriculture Students and Teachers About the Role of Vocational Agriculture in Rural Schools--A Critique... 240
Frank Bobbitt, Michigan State University

SOE Programs in Illinois - Teacher Philosophies and Program Characteristics.. 241
Edward W. Osborne, University of Illinois

SOE Programs in Illinois - Teacher Philosophies and Program Characteristics--A Critique..................................... 249
George Wardlow, University of Minnesota

Teacher Presage Variables and Quality Supervised Occupational Experience: Is There a Relationship?............................ 250
Richard C. Makin, Oklahoma State Department of Vocational and Technical Education and
Larry E. Miller, The Ohio State University

Teacher Presage Variables and Quality Supervised Occupational Experience: Is There a Relationship?--A Critique................. 258
George Wardlow, University of Minnesota

The College Preparatory Curriculum and Academic Performance in College: How Does Vocational Agriculture Fit into the Picture?.. 259
J. Robert Warmbrod and David L. Doerfert, The Ohio State University

The College Preparatory Curriculum and Academic Performance in College: How Does Vocational Agriculture Fit into the Picture?--A Critique.. 267
Alan A. Kahler, Iowa State University

The Effect of Participation in Secondary Vocational Agriculture on Success in Postsecondary Education............................ 268
Jack L. Rudolph, Jr. and Edgar P. Yoder, The Pennsylvania State University

The Effect of Participation in Secondary Vocational Agriculture on Success in Postsecondary Education--A Critique................. 276
Stacy A. Gartin, West Virginia University

The Evolution of the Problem-Solving Approach in Agricultural Education: A Historical Analysis.............................. 277
Cynthia B. Lass and Jeffrey W. Moss, Louisiana State University

The Evolution of the Problem-Solving Approach in Agricultural Education: A Historical Analysis--A Critique...................... 285
Philip Buriak, Mississippi State University

The Role of Extension in Rural America as Preceived by United States Senators... 286
Michael P. Hogan, Ohio Cooperative Extension Service and Layle D. Lawrence and Stacy A. Gartin, West Virginia University

The Role of Extension in Rural America as Preceived by United States Senators--A Critique............................... 294
Dennis Scanlon, The Pennsylvania State University

Video-Simulation as a Computer Applications Instructional Technique for Agricultural Professionals and Students............ 295
Jonathan Atherton and Philip Buriak, Mississippi State University

Video-Simulation as a Computer Applications Instructional Technique for Agricultural Professionals and Students--A Critique... 303
Edward W. Osborne, University of Illinois

Vocational Agriculture Program Quality and Factors Related to Program Quality.. 304
Gary S. Straquadine and R. Kirby Barrick, The Ohio State University

Vocational Agriculture Program Quality and Factors Related to Program Quality--A Critique................................ 312
Dennis Scanlon, The Pennsylvania State University

Alternate Papers

Assessment of Three Microcomputer Teaching Strategies in Vocational Agriculture... 313
Robert J. Birkenholz and Bob R. Stewart, University of Missouri-Columbia, Michael J. McCaskey, State University of New York-Cobleskill, and Thomas D. Ogle, Missouri Department of Elementary and Secondary Education

Factors Associated With the Academic Success of International Students Studying Agriculture in U.S. Institutions................ 321
George Wardlow, University of Minnesota

Job Satisfaction of 4-H Agents of the Cooperative Extension Service.. 327
Terrence S. Marshall and Michael F. Burnett,
Louisiana State University

Summary Presentation

Qualitative Research: Implications for Agricultural Education Research.. 335
Floyd L. McKinney, The National Center for Research in
Vocational Education, The Ohio State University

11

PREFACE

Since 1974, leaders in agricultural education have met annually at the national level to present and discuss research conducted in the profession. Studies presented represented the best from across the nation as judged by the referees. Over the years, the number of participants in the meeting continued to grow, from a total of twenty-five to thirty in the earliest meetings to approximately 200 participants today.

This years program includes the involvement of individuals from some 35 states. A total of 91 research paper proposals were submitted for consideration to be presented at the fourteenth annual meeting. Thirty-six research papers and three alternate papers, judged to be the best by the referees, are included in these proceedings. The acceptance rate was 39.5 percent; 42.8 percent when the alternate papers are included.

A national meeting on research is needed for several reasons. Agricultural educators are involved in a rapidly changing, dynamic profession. In order to stay on the cutting edge of change, they must address critical issues confronting the profession aggressively and conduct research which will provide a solid operational base.

The conduct of the 1987 National Agricultural Education Research Meeting (NAERM) attempts to meet these needs and addresses several purposes of the profession. Although heretofore never expressed explicitly, the Annual National Agricultural Education Research Meeting seems to fulfill the following primary purposes:

1. To present and disseminate the most recent and best research on the national level as judged by referees.
2. To present and disseminate critiques of the research by researchers in the profession.
3. To provide a forum for discussion of methodology and results.
4. To provide feedback to authors regarding research procedures and methodology used.
5. To provide suggestions to authors for preparing manuscripts for publication.
6. To give novice researchers an overview of current research issues, methodology, and critique within the profession.
7. To improve the quality of research conducted in future years.
8. To identify and recognize the Outstanding Paper Presentation at the National Agricultural Education Research Meeting on an annual basis.
9. To provide a written record of quality research completed and professional critique over time.

10. To broaden horizons and chart new directions for the conduct of agricultural education research in the future.

The purposes expressed above are presented with the hope that they will stimulate discussion and help the profession advance.

In an attempt to provide a broader base of research to be presented at future meetings, a presentation on qualitative research has been included. Dr. Floyd L. McKinney, Senior Research Specialist, The National Center for Research in Vocational Education, The Ohio State University, has extensive experience and background in qualitative research. Just as it has been refreshing to see historical studies being presented at recent meetings, it will be interesting to see whether or not any qualitative research studies are included in future years. Perhaps, as the profession grows, in the future paper proposals will be submitted to categories of research: descriptive, relationship, historical, experimental or qualitative. Another dimension might be to include more invited addresses or to establish special interest groups to discuss research on given topics.

Whatever direction the NAERM takes in the future, it has had a successful past. The expectation of quality for the 1987 NAERM was established by those who chaired previous meetings. The 1987 NAERM is the fourteenth meeting in a series of distinquished meetings. Previous meetings, chaired by dedicated professionals, were:

Number	Year	Location	Chairperson and Name of Institution
1	1974	New Orleans, LA	Hollie Thomas, Florida State University
2	1975	Anaheim, CA	Hollie Thomas, Florida State University
3	1976	Houston, TX	Glen Shinn, Mississippi State University
4	1977	Atlantic City, NJ	William Richardson, Purdue University
5	1978	Dallas, TX	Bennie Byler, Mississippi State University
6	1979	Anaheim, CA	Ronald Brown, Mississippi State University
7	1980	New Orleans, LA	L.H. Newcomb, The Ohio State University
8	1981	Atlanta, GA	Maynard Iverson, N. Carolina State University
9	1982	St. Louis, MO	Dale Oliver, Virginia Polytechnic Institute-State University
10	1983	Anaheim, CA	Paul R. Vaughn, New Mexico State University
11	1984	New Orleans, LA	Jimmy G. Cheek, University of Florida
12	1985	Atlanta, GA	Bob Stewart, University of Missouri
13	1986	Dallas, TX	Alan A. Kahler, Iowa State University

I hope that the contents of the proceedings of the 1987 NAERM will be useful to all who receive them. I also hope that all presenters will submit their work for possible publication in a professional journal. It is time to begin preparing for the 1988 NAERM. Please submit paper proposals for consideration to Edgar P. Yoder, The Pennsylvania State University. Any suggestions you may have for improvement of future meetings will be appreciated.

Alfred J. Mannebach, Chairperson
1987 National Agricultural
Education Research Meeting

ACKNOWLEDGMENTS

An undertaking of the magnitude of this meeting required the involvement of many professionals in agricultural education. The expectation of quality for the 1987 NAERM was established by those who conducted previous meetings. I want to acknowledge my sincere thanks to a number of individuals who helped make this annual meeting successful: to Alan A. Kahler, 1986 NAERM Chairperson, who initiated the practice of providing bound proceedings and provided an outstanding example to follow; to Stacy A. Gartin, Chairperson, Research Committee, Agricultural Education Division, American Vocational Association, and to Research Committee members for sponsoring and assisting in conducting the meeting; to George C. Hill, Program Chairperson, Agricultural Education Division, American Vocational Association, who made many arrangements and coordinated the overall program planning effort; to Patrick B. Mullarney, Head, Department of Educational Leadership, University of Connecticut for providing secretarial and administrative support; to Nancy Toomey who served as administrative assistant; to the participants in the program--referees, chairpersons, facilitators, discussants, presenters, outstanding paper presentation evaluators and registration workers--whose efforts resulted in an excellent conference; and to all members of the profession who submitted research paper proposals and permitted their work to be judged by their peers.

A special "Thank you" is due to the following individuals who served as referees and whose work provided the basis for the objective selection of papers to be presented.

Referees

Connie D. Baggett, The Pennsylvania State University
Frank Bobbitt, Michigan State University
Blannie E. Bowen, The Ohio State University
Stanley Burke, Virginia Tech
Richard Clark, The Ohio State University
Joseph G. Cvancara, Washington State University
David Drueckhammer, University of Southwest Louisiana
Stacy A. Gartin, West Virginia University
Thomas Grady, University of Wisconsin-Madison
Everett Harris, University of Vermont
Janet L. Henderson, The Ohio State University
John Hillison, Virginia Tech
Maynard Iverson, University of Georgia
Alan A. Kahler, Iowa State University
Barbara Malpiedi, North Carolina State University
Robert Martin, Iowa State University
Martin McMillion, Virginia Tech
Larry Miller, The Ohio State University
Kerry Odell, West Virginia University
Donald Priebe, North Dakota State University
Fred Reneau, Southern Illinois University
Carl Reynolds, University of Wyoming
Louis Riesenberg, University of Idaho

Dennis Scanlon, The Pennsylvania State University
Bob R. Stewart, University of Missouri
George Wardlow, University of Minnesota
Richard Welton, Kansas State University
Jeffrey A. Wood, Illinois State University

Following is a list of support personnel, members of the profession, who gave their time and expertise in the conduct of the meeting. Their efforts were much appreciated.

Discussants

Frank Bobbitt, Michigan State University
Philip Buriak, Mississippi State University
Stacy A. Gartin, West Virginia University
John Hillison, Virginia Tech
Alan A. Kahler, Iowa State University
Martin McMillion, Virginia Tech
Larry Miller, The Ohio State University
Jeffrey Moss, Louisiana State University
L.H. Newcomb, The Ohio State University
Edward W. Osborne, University of Illinois
Dennis Scanlon, The Pennsylvania State University
George Wardlow, University of Minnesota

Chairpersons

Robert J. Birkenholz, University of Missouri
Blannie Bowen, The Ohio State University
Ronald A. Brown, Mississippi State University
Susan Camp, State University of New York-Oswego
M. Joy Cantrell, The Pennsylvania State University
Thomas Grady, University of Wisconsin-Madison
J. Alex Hash, Clemson University
Vernon D. Luft, North Dakota State University
Barbara Malpiedi, North Carolina State University
Douglas A. Pals, University of Idaho
Jerry L. Peters, Purdue University
William L. Thuemmel, University of Massachusetts

Facilitators

Connie D. Baggett, The Pennsylvania State University
Gary Briers, Texas A & M University
Stanley R. Burke, Virginia Tech
Richard Clark, The Ohio State University
Elmer Cooper, University of Maryland
David C. Drueckhammer, University of Southwest Louisiana
Kreshna Eastman, Iowa State University
Robert Martin, Iowa State University
Fred W. Reneau, Southern Illinois University
Louis E. Riesenberg, University of Idaho
Tim Rollins, Iowa State University
Bob R. Stewart, University of Missouri

Registration Workers

Jacquelyn Deeds, Mississippi State University
Marty Frick, Iowa State University
Don King, Iowa State University
Milton S. Natusch, Connecticut State Department of Education
Patricia Natusch, Connecticut State Department of Mental Retardation
Linda Whent, Iowa State University

Outstanding Paper Presentation Evaluators

The Outstanding Research Paper Presentation Committee is a sub-committee of the Research Committee, Agricultural Education Division, American Vocational Association. The purpose of the committee is to select the Outstanding Research Paper Presentation at the annual NAERM. The Chairperson of the Committee this year was Jimmy Cheek, University of Florida. Committee members were Phil Buriak, Mississippi State University and Janet Henderson, The Ohio State University. The committee identified evaluators to rate presentations made at the meeting. Research paper presentations for the 1987 NAERM were evaluated by Session Chairpersons, Discussants and selected at large members of the profession. Their efforts are appreciated very much.

Each of the above individuals contributed time and effort to the conduct of the meeting. It was through the individual contributions made by each person that the meeting was a success. My sincere appreciation goes to all who assisted. Your willingness to serve helped make chairing the meeting a pleasure.

Alfred J. Mannebach, Chairperson
1987 National Agricultural
Education Research Meeting

NATIONAL AGRICULTURAL EDUCATION RESEARCH MEETING

Paper Proposal Evaluation Form

Evaluator ______________________ Proposal Number ________

Proposal Title: ______________________________________

Please rate the attached paper proposal on the following factors. When evaluating the paper for each of the factors, circle the number on the scale provided for the factor that most nearly reflects the value that you feel should be placed on the factor based on the scale descriptors at the top of each column of figures.

	Poor	Weak	Fair	Good	Excellent
Significance of study to agricultural education	1	3	6	9	11
Literature review and theoretical/conceptual framework	1	3	6	9	11
Soundness of design and instrumentation	1	3	6	9	11
Soundness of sampling procedures and statistical analysis	1	3	6	9	11
Clarity of results with conclusions supported by findings	1	3	6	9	11
Contribution to knowledge about agricultural education	1	3	6	9	11
Organization of paper including writing style, grammar, spelling, etc.	1	3	6	9	11

Total score (sum of values you circled for the above items) ________

What is your recommendation for the proposal (check one)?

_____ Include it in the program

_____ Reject it for the following reasons (it is important to share information with the author(s); your comments will be kept anonymous by name): ______________________________

____

____

____

____

Rating Form for
OUTSTANDING RESEARCH PRESENTATION AWARD
National Agricultural Education Research Meeting

Session ___________ Author(s) ____

____

TO THE RATER:

Please rate the research presentation in each of the six categories. DO THIS AFTER THE DISCUSSANT HAS MADE HIS/HER COMMENTS. Research the highest ratings for those presentations that clearly demonstrate excellence in each category. An author must present the paper to be eligible for the award.

USE THIS SCALE TO RATE THE FOLLOWING ITEMS

1	2	3	4	5	6	7	8	9	10
Strongly Disagree		Disagree		Uncertain			Agree		Strongly Agree

---

NOTE: USE N/A (NOT APPLICABLE) IF CRITERION DOES NOT APPLY.

__________ 1. The research as reported has an impact on agricultural education.

__________ 2. The study as reported contributes to further research and/or practice in agricultural education.

__________ 3. Appropriate research methods were used to conduct the study.

__________ 4. Appropriate statistical analysis was used to interpret the data.

__________ 5. Presenter(s) effectively communicated the research study to the assembly.

__________ 6. Presenter(s) utilized appropriate visuals.

__________ TOTAL SCORE (Sum of scores)

Research Committee: Agricultural Education Division
American Vocational Association

A COMPARISON OF 1972 AND 1980 SECONDARY AGRICULTURAL EDUCATION STUDENTS

K. K. Navaratnam
Doctoral Graduate
Agricultural Education
Virginia Tech

J. Dale Oliver
Professor
Agricultural Education
Virginia Tech

INTRODUCTION

Agricultural education continues to provide occupational training to secondary students who pursue it to prepare for a beginning career in agriculture. The decade of the 1970s was an important time for agricultural education. The landmark Vocational Education Act of 1963 had been discussed and evaluated for seven years by the time the 1970s began. Girls were first admitted to the national Future Farmers of America (FFA) in 1969 and became full-fledged participants in agricultural education and FFA activities during this period. Efforts to enhance the performance and quality of agricultural education have increased since the mid-1970s (Lee, 1985). Accordingly, agricultural educators throughout the nation focused on curriculum development based on the practices and trends in agricultural industries, instructional approaches to develop cognitive and psychomotor skills, program standards for quality programs and competencies needed in agricultural occupations. Agricultural educators have also expanded the horizon of the FFA, used supervised occupational experiences, and made efforts to develop recruitment activities and retain high quality agricultural teachers at the secondary level.

Unlike the students of the 1970s, the students of the 1980s passed through a variety of national efforts to improve agricultural education in addition to other changes. The specification of standards for quality agricultural education programs was carried out by Iowa State University with support by the U.S. Office of Education (Department of Agricultural Education, 1977). Also, a nationwide study was made to identify and validate essential competencies needed for entry and advancement in major agriculture and agribusiness occupations (McClay, 1978).

There were many reasons for expecting differences in the agricultural education students and in programs between 1972 and 1980. The conditions and environments agricultural education and its students faced, whether in school or out of school, were quite different. In fact, one might expect a difference in the characteristics, performance, and goals and objectives of students between any two points in time. Despite the expected changes in the agricultural education program during the past several years from the perspective of students' characteristics and in teaching and learning practices, very little is known about them. Various investigators have addressed the changes that occurred in student characteristics and in educational practices based on broad notions of vocational education rather than specific service areas such as agricultural education (Greenan, 1986; Lotto, 1986; Owens, 1986; Wonacott, 1986). A study of conditions of agricultural education between 1972 and 1980 would be useful not only from the viewpoint of the present concerns, but also to enhance excellence in agricultural education at the secondary level. Thus, this study was undertaken to describe a national sample of secondary agricultural education students on their demographic composition, school experience, performance, self-perception, values, and their plans and aspirations.

PURPOSE AND OBJECTIVES

The purpose of this study was to describe and assess the changes between the senior secondary agricultural education classes of 1972 and 1980 on selected demographic variables, school experiences, values, and their plans after high school. Specific objectives of the study were: (a) to determine the changes in student background characteristics such as race, sex, religion, and socioeconomic status, (b) to determine the changes in academic ability of students over the eight year period, (c) to determine the relative changes between the two groups of students in terms of their self-concept, locus of control, work value, family value, and community value, and (d) to determine the short-term plans of agricultural education seniors after their high school education.

PROCEDURES AND ANALYSIS OF DATA

The methodology consisted of a descriptive cross sectional analysis of the senior class of agricultural education students in the National Longitudinal Survey (NLS) with a base year of 1972 and first year follow-up data (National Center for Education Statistics, 1981) and the High School and Beyond (HSB) base year of 1980 and first year follow-up data (National Center for Education Statistics, 1983). For the NLS study, over 16,000 seniors in more than 1,000 public and private schools participated. In the HSB study, base year and follow-up data were collected from approximately 28,000 seniors in 1,015 public and private high schools across the nation.

In both years, the students were selected through a two-stage probability sample, with schools as the first stage units and students within schools as the second stage units. The NLS sample design was a stratified national probability sample of schools with the selection of simple random samples of 18 seniors from each school (Riccobono, Henderson, Burkheimer, Place, & Levinsohn, 1981). The HSB sample design was a highly stratified national probability sample of schools with the selection of simple random sample of 36 seniors per school. Thus, the NLS and HSB studies were highly similar in terms of concept, purpose, and scope of the data collected.

The 1972 and 1980 senior agricultural education students were identified based on the self-declared curriculum categories in the data set. It was assumed that the self-identified curriculum type provided a uniform method of selecting students and this method was used because the HSB data set did not include school reported information such as courses taken for its senior cohort. All the students that identified themselves as "Agricultural Education Major" were included in this study. Accordingly, the 1972 sample consisted of 373 seniors and the 1980 sample consisted of 390 seniors. Descriptive statistical analysis was used in this study. Because the data sets contain information on similar variables, a unique opportunity was provided to compare them at two points in time. The test items consisted of vocabulary, reading, and mathematics. Test data and some composite variables were continuous and were analyzed using simple independent _t_ tests but with critical values adjusted for root design effects and large sample sizes. Analyses of categorical variables were limited to frequency counts and comparisons since adjusted critical values were not available. Weights relevant to both data sets were used in the analysis to provide estimates of population proportions.

Socioeconomic status (SES) was a composite of the five components of father's education, mother's education, parents' income, father's occupation, and household items. Academic ability was determined from the composite value of standardized test scores in vocabulary, reading, and mathematics. Self-concept, locus of control, work orientation, community, and family values were measured by the mean percentage of persons who answered on rating scales on the statements related to each composite variable. Self-concept was created from the responses obtained on the statements (a) I take a positive attitude toward myself, (b) I feel I am a person of worth, on an equal plane with others, (c) I am able to do things as well as most other people, and (d) On the whole , I am satisfied with myself. Similarly, locus of control was measured by the mean percentage of persons who answered on the following statements (a) Good luck is more important than hard work for success, (b) Every time I try to get ahead, something or somebody stops me, (c) Planning only makes a person unhappy since plans hardly ever work out anyway, and (d) People who accept their condition in life are happier than those who try to change things. The self-concept and locus of control were measured on a 5-point scale: 1=strongly agree, 2=agree, 3=disagree, 4=disagree strongly, 5=no opinion.

Orientation toward work, community, and family values were measured in the same manner as self-concept and locus of control. However, in this case a 3-point rating scale (1=very important, 2=somewhat important, and 3=not important) was used to respond to the question "How important is each of the following to you in your life." The statements on work orientation consisted of (a) being successful in my line of work , (b) having lots of money, and (c) being able to find steady work. The statements about (a) having strong friendships, (b) being a leader in my community, (d) being able to give my children better opportunities than I have had, and (d) working to correct social and economic inequalities considered for community orientation. Family orientation was measured on (a) finding the right person to marry and having a happy family life, (b) living close to parents and relative, and (c) getting away from this area of the country.

RESULTS

The findings show that there were considerable changes in the demographic characteristics over the eight-year period. Table 1 shows a 11.8% increase in the enrollment of female students. The racial composition also changed with the most notable change being a 7.1% increase in Black students. There were also major shifts in the religious composition of the senior agricultural education classes. Large increases were noticed among Protestant and Roman Catholic students during the study period. There were no major changes in the socioeconomic status of the two classes of senior agricultural education students.

Table 2 presents the mean differences between 1972 and 1980 test batteries on vocabulary, reading, and mathematics and their tests of significance. According to the adjusted critical value procedure (see note on Table 2), there were no significant changes in the three test scores considered to measure academic ability of the senior classes.

Self-reported grades (the scaled ranged from 1=mostly below D to 8=mostly A) were analyzed for the seniors. The analysis showed that the categories mostly A increased by 4.4%, and half A and B increased by 12.7% during the eight-year period. However, during the same period, mostly D increased by 5.0%.

Table 1. Comparisons of Demographic Characteristics of Agricultural Education Students

Categories		1972	1980
Sex	Male	85.8	74.0
	Female	14.2	26.0
Race	Hispanic or Spanish	5.2	6.3
	Am. Indian or Alaskan natives	3.5	0.9
	Asian or Pacific Islanders	0.1	0.6
	Black	10.3	17.4
	White	73.5	74.8
	Other	7.5	-
Religion			
	Protestant	31.9	55.0
	Roman Catholic	19.8	31.0
	Other Christian	30.1	4.6
	Jewish	0.9	0.1
	Other religions	8.7	2.2
	No religion	8.5	7.2
Socioeconomic status			
	Low	44.9	41.4
	Middle	47.2	50.2
	High	8.0	8.2

Note: Numbers in table are weighted population proportion estimates.

Table 2. Tests of Significance of Test Batteries

Scaled items	1972	1980	*t* value
Vocabulary			
Mean	43.1090	43.5050	-0.5837
SD	8.1461	8.0793	
N	275	298	
Reading			
Mean	43.0145	43.0437	-0.0385
SD	9.4165	8.7576	
N	275	298	
Math			
Mean	43.3781	42.5392	1.1643
SD	8.5321	8.6789	
N	275	296	

Note: For making the judgements reported in this table, the average of the root design effects (1.2 for 1972 and 1.6 for 1980) was multiplied times the tabled *t* value for an alpha of .01 (2.576, two-tailed test)resulting in an adjusted critical value of 3.61. See procedure recommended by Fetters, Brown, & Owings, 1984.

There were changes in the hours spent on homework per week. Less than 5 hours spent on homework increased from 53.9% in 1972 to 75.6% in 1980. However, the proportion of students who spent more than 5 hours homework per week decreased considerably from 1972 to 1980.

Findings in the Table 3 indicate that there have been significant shifts in the locus of control and family value. Four items were employed to measure locus of control. Table 3 shows that there was a decrease in this variable indicating that the 1980 seniors feel they are less in control of their situation than the 1972 seniors. Table 3 also indicates that there has been a significant increase in family value from 1972 to 1980. This reflects the change with regard to the amount of importance attached to parents and relatives and getting away from this area of the country.

Table 3. Tests of Significance of Some Composite Variables of Agricultural Education Students

Variable	1972	1980	_t_ value
Self concept			
Mean	2.0789	1.9470	2.4247
SD	0.6110	0.7277	
N	282	324	
Locus of control			
Mean	3.3356	2.9169	6.5881*
SD	0.8213	0.7314	
N	283	323	
Work value			
Mean	2.6028	2.6538	-1.8563
SD	0.3337	0.3418	
N	282	326	
Family value			
Mean	0.9054	2.0843	-34.1014*
SD	0.4472	0.3980	
N	282	326	
Community value			
Mean	2.1708	2.0562	3.1019
SD	0.4702	0.4370	
N	281	323	

Note: Same as in the Table 2. $*p<.01$

When the seniors were asked to indicate their plans, the analysis revealed that the percentage of seniors who planned some form of postsecondary education as "the one thing that most likely will take the largest share of your time in the year after you leave high school" showed a mixed shift between 1972 and 1980. Four year college was the most frequently mentioned plan, involving an increase from 47.9% in 1972 to 55.1% in 1980. The percentage of seniors planning to work full-time decreased from 16.2% to 10.3% while the percentage planning to be in military service increased from 5.0% to 10.8% during the eight-year period. Students in both years were asked, regardless of their plans, if they thought they had the ability to complete college. The responses ranged from yes, definitely to definitely not. The students responses indicate that they believed that they had the ability to complete college showing an increase in yes, definitely category from 19.7% in 1972 to 26.3% in 1980. A similar increase was noticed in the yes, probably response category.

The students were asked in 1972 and 1980 to indicate the type of job they expected or planned to have at age 30. The proportion of students indicating they planned to enter professional jobs such as accountant, artist, clergyman, dentist, physician, registered nurse, engineer, lawyer, scientist, librarian, politician, and school teacher increased from 10.0% in 1972 to 17.8% in 1980. More of the 1980 seniors than 1972 seniors planned to choose female-dominant jobs (15.6% vs. 10.8%) such as clerical, homemaker or housewife, sales, and services. This was compensated for by a substantial decline in those planning to choose male-dominant jobs (89.2% vs. 80.0%) such as craftsman, farmer/farm manager, military, operative, protective, and technical.

CONCLUSIONS AND/OR RECOMMENDATIONS

A comparison of self-reported data for the 1972 and 1980 senior classes of secondary agricultural education students was made to determine how these young adults changed during this eight-year period with regard to their demographic characteristics, academic ability, their view of themselves, sense of control of their environment, their orientation toward work, family and community, and their short-term plans for the year after their high school. Findings of the demographic characteristics studied showed that enrollment of female and Black students has increased considerably between 1972 and and 1980. These shifts may be due to the policies set by the Federal government regarding participation of minority and female students in vocational education programs.

Achievement of students in standardized tests is a good indicator of academic ability and any changes in test score levels may have influences on their life outcomes (Eckland, 1982). Although there was a decline in the performance of secondary education students in general between 1972 and 1980 (Fetters, et al., 1984), the findings of this study revealed that there was no significant change in academic ability of agricultural education students during the same period. From 1972 to 1980, attitudes and values of senior agricultural education students have changed significantly with decreased locus of control and increased family value. Agricultural education students in the 1980s believed their lives are largely controlled by events and circumstances over which they have little or no influence. The higher value placed on family may be associated with the farming crisis which emerged during the late 1970s.

High school graduates make important transitional decisions in their lives after 12 years of full-time schooling. Two of the most important decisions are about their work or occupation and education after high school. The eight-year trends in planned activities were confined to the three categories of attending a 4-year college, working full-time, and entering military service. Despite the fact that there is often a gap between students' plans and the reality of their immediate activities, the trend of changes is fairly consistent with their perception of ability to complete a college education immediately after high school.

Secondary agricultural education students in 1972 and 1980 were most likely to aspire to a job in a male-dominant occupation. It is no surprise to find that many of them had farmer/farm manager as their primary occupational goals in spite of its decreased trend towards 1980. Obviously, the female-dominant occupational category showed a slight increase because of the increased enrollment of female students in the agricultural education program. Aspiration for professional jobs at age 30 was consistent with enrollment in a 4-year college as one of the preferred choices.

Finally, the major purpose of this study was to determine the changes that occurred between the senior agricultural education students of 1972 and 1980. The researchers urge that longitudinal and cross-sectional analyses of agricultural education programs and students be conducted to assess the changes in educational and occupational experiences of individuals and of the development of their aspirations, attitudes, and activities which provide information needed for meaningful planning for excellence in agricultural education at the secondary level.

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A COMPARISON OF 1972 AND 1980 SECONDARY AGRICULTURAL EDUCATION STUDENTS

A Critique

Dennis C. Scanlon, The Pennsylvania State University -- Discussant

I would like to commend the researchers on a very tight study. The purpose and objective of the study were very well stated and the procedures and analysis of data were done correctly. I would especially compliment the researchers for describing the sampling procedure, even though they were not directly involved, and the excellent use of descriptive statistics to describe the results. These "courtesies" made the paper easy to read and understand.

My comments fall into two categories...the conceptual base for the study, and the implications for action as a result of the study. A conceptual base is the hypothetical framework within which the study is conceived. It provides the theoretical base for formulating hypotheses which guide the researcher as he seeks to discover another piece of a "larger puzzle." What piece of the puzzle were you looking for? Where does this study contribute to our existing knowledge base regarding agricultural education? As a reviewer it would have been helpful to read a few paragraphs of "rationale for the study" so that I could conceptualize in my mind the direction this study was going.

My second point regards the selection and implications of studying the set of variables. The NLS study contains over 2900 variables. What was the rationale for the variables selected? Was there a clear indication from the review of literature that these variables had a significant relationship to future programming? I raise the question why these variables were used, when clearly other variables--such as the large increase in special needs populations--had more significant impact on program planning. A better description of the relationship between literature review and variable selection would be helpful. An implications section could have been used to build a case for the importance of each variable researched. A thorough description of each variable as it relates to future programming consideration could have tied together the beginning and end of the study. Research without application generates pure empirical data and a considerable amount of nice-to-know information. I would suggest the researchers seek ways to apply the empirical data they have generated.

Again, let me commend the researchers for a very methodologically correct study, and for seeking out and using a data base that still holds a treasury of information.

A DAY LATE AND A DOLLAR SHORT:
DOCTORAL RESEARCH IN AGRICULTURAL EDUCATION

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INTRODUCTION

A decade ago Krebs (1976) indicated that research in agricultural education was not concentrating on significant problems. He faulted research in agricultural education for not being systematic nor focused on crucial problems. According to Warmbrod (1986) research should be conducted on significant problems that are of concern to the profession. Is doctoral research in agricultural education doing that?

Stewart, Shinn and Richardson (1977) identified the concerns of the profession and urged researchers to conduct research in the areas identified. However, Mannebach (1980) found that over one-fourth of the research conducted was "nonapplicable" to the concerns of the profession and another 25 percent of the research was not in the areas of utmost concern. Since graduate students conduct over 3/4 of the research in agricultural education (Mannebach, McKenna, and Pfau, 1984) it would be logical to assume that much of this research is not on the topics of most concern to the profession.

During the past eight decades over 900 doctoral dissertations have been written on agricultural education topics. A critical examination of these dissertations may help the profession to determine if research in agricultural education is indeed a random "happening" on insignificant topics or if there is some order and significance to the research. If the research is found to be lacking, then the profession should take steps to rectify the situation.

PURPOSE AND OBJECTIVES

The purpose of this research was to determine if there was a focus to doctoral research in agricultural education between 1900 and 1986; and if there was a focus, was the focus on the problems facing the profession.

METHODS AND PROCEDURES

The target "population" for the research was all doctoral dissertations written on agriculture education topics. Agricultural education topics were identified as those topics that have a major impact on the content, organization, and delivery of agricultural knowledge and skills to clients typically served by vocational agriculture teachers and extension agents. Additionally, dissertations that examined historical, philosophical or professional issues in agricultural and extension education were included in the study.

A computerized search coupled with a hand search of Dissertation Abstracts International (DAI) was conducted. Dissertations in DAI are identified by a descriptor category. "Education-Agricultural" has been used since 1976 as a descriptor title. Therefore, the term "Education-Agricultural" was the term used to search for dissertations in agricultural education between 1976 and 1986. Between 1964 and 1975 most agricultural education dissertations were in the descriptor category of Education-Vocational". Between 1964 and 1950 doctoral dissertation topics could be found under several categories including "Agriculture- General", "Education-General", and "Education-Administration". Prior to 1950, the terms "Agriculture" or "Education" were used. The researcher is not positive that all the dissertations have been identified because the author of the dissertation identifies the category to use in classifying the dissertation and could classify it under a category that was not searched by the researcher.

The data were placed in a computerized data base (Dbase III). Various combinations of data were retrieved from the data base for examination. Since the research was on the total population of dissertations no statistical analyses were performed other than descriptive statistics.

FINDINGS

At least 970 dissertations have been written on agricultural education topics. The first dissertation on the topic of agricultural education was written in 1906 at Clark University by James Ralph Jewell. The title of his dissertation was "Agricultural Education, Including Nature Study and School Gardens." Two other dissertations were written in the 1900-1909 era, one at Minnesota and one at Cornell.

During the 1910 to 1919 era four dissertations were written on the topic of agricultural education. One was from Cornell, two were from Columbia University, and the final one was written by A. V. Storm at George Peabody College for Teachers.

The 1920 to 1929 decade saw a growth in doctoral research in agricultural education. Twenty-six dissertations were produced during this time period. Seven came out of Cornell, four were from Columbia, and four were from George Peabody College for Teachers. Other universities represented during this period included Illinois, Purdue, George Washington University, Indiana, Minnesota, Nebraska, Wisconsin, California, and Johns Hopkins.

Forty-eight dissertations were written during the 1930-1939 decade. Thirty (64%) of these were written at Cornell. During this decade Iowa State, Penn State, Missouri, and Ohio State joined the ranks of institutions that had agricultural education dissertations. Dissertations were also written at the University of Chicago (H. M. Hamlin), American University, University of North Carolina, and Columbia (W. F. Stewart, Ray Fife, and G. A. Schmidt).

The 1940-1949 era saw a decline in doctorates. Twenty-nine dissertations were identified during this decade. Twelve were from Cornell, five were from Penn State, Ohio State had four, and the remainder were spread between, Missouri, Illinois, Minnesota, California, and Stanford.

One hundred and fifty-six dissertations were written in the 1950-1959 era. The dominance of Cornell subsided during this decade. Eight different universities had 10 or more doctorates. The leading universities during the 1950-59 decade were: Ohio State, Penn State, Michigan State, Illinois, Cornell, Louisiana State, Minnesota, and Missouri.

There was a slight rise in doctoral studies during the sixties with 177 being written. Ohio State produced the most studies followed by Penn State, Cornell, Michigan State, Oklahoma State, and Missouri. During the 1960s, doctorates on agricultural education topics were written at 29 different universities including such non-agricultural universities as Houston, New York University, George Washington, Indiana, Duke, North Carolina, Stanford, Alabama, and the University of Northern Colorado.

There was a rapid growth of doctoral studies during the 1970s. A total of 255 dissertations were written with Ohio State leading in the number of dissertations. Several new universities emerged during this era such as Texas A & M, Mississippi State, Virginia Tech, Kansas State, and Maryland.

Two hundred and seventy-two dissertations were written between 1980 and 1986 (those listed through the January 1987 issue of DAI). Three universities accounted for 42 percent of the studies. They were Ohio State, Iowa State, and Oklahoma State.

A listing of all universities producing at least 10 doctorates in agricultural education are found in Table 1. Eighteen universities have produced at least 10 dissertations on agricultural education topics. These 18 universities have been responsible for 861 dissertations (89%). Six universities have accounted for over half of the dissertations (566, 58%). They are Ohio State, Cornell, Penn State, Iowa State, Oklahoma State, and Missouri. Not listed in Table 1 are the 46 universities that have produced less than 10 dissertations.

There has been a marked evolution in the topics being researched in agricultural education. Prior to 1917 the dissertations were generally on the current status of agricultural education. After the passage of the Smith-Hughes Act there was considerable interest in three major areas - organization and administration, teacher training, and curriculum. These three area of concerns accounted for nearly fifty percent of the dissertations through the 1940 decade.

During the 1950 decade more dissertations were written on teacher education than any other singular topic. The primary emphasis in many of the teacher education dissertations was on evaluation of existing teacher education programs. Five such dissertations came out of Ohio State with evaluations of Alabama Polytechnic, Ohio State, Tuskegee, Virginia State, and South Carolina State undergraduate teacher education programs. The first dissertations on agricultural mechanics surfaced during the 1950 decade with 12 being written.

In the 1960 decade there was an emergence of doctoral dissertations on curriculum/program planning and the effectiveness of different teaching strategies. There were nine studies on curriculum and training needs for off-farm agriculture. These nine studies were written after 1963.

Table 1

Institutions With at Least Ten Dissertations in Agricultural Education

Institution	Pre-1930	1930-1939	1940-1949	1950-1959	1960-1969	1970-1979	1980-1986	Total
Columbia	6	4	-	-	-	-	-	10
Cornell	9	30	12	13	18	10	10	102
Illinois	2	1	2	14	8	12	12	51
Iowa State	-	1	-	5	8	31	38	83
Kansas State	-	-	-	-	-	7	7	14
Louisiana State	-	-	-	11	8	10	11	40
Maryland	-	-	-	1	2	6	5	14
Michigan State	-	-	-	14	16	6	8	44
Minnesota	3	1	1	11	7	9	5	37
Mississippi State	-	-	-	-	-	1	10	11
Missouri	-	2	3	11	11	17	18	62
Ohio State	-	2	4	24	31	55	43	159
Oklahoma State	-	-	-	3	12	25	32	72
Penn State	-	3	5	23	19	15	22	87
Purdue	1	-	-	3	3	6	-	13
Texas A&M	-	-	-	-	2	7	10	19
Wisconsin	1	-	-	2	7	8	3	21
Virginia Tech	-	-	-	-	-	7	15	22
Totals	22	44	27	135	152	232	249	861

It appears that there was a concerted effort between 1969 and 1971 in the Central Region to write dissertations on the effectiveness of different teaching strategies. There were 14 dissertations written in the Central Region with seven of these coming from Iowa State. The title of these dissertations typically started with the words "Experimental Evaluation" and examined such topics as transparencies, films, individualized instruction, demonstrations, field trips, prepared lesson plans, and audio tutorial teaching.

The trend for dissertations on curriculum/program planning (particularly off-farm agriculture) continued strong into the early 1970s but faded. Three other areas emerged during the 1970s, adult education, international, and teacher training. Eighteen percent of the dissertations during the 1970s were on international topics, 13 percent on adults, and 13 percent on teacher training. A number of the teacher training dissertations were conducted on "professional or technical" competency needs of teachers.

Two themes accounted for about half of the dissertations during the 1980 era. Dissertations on international topics accounted for 24 percent of the dissertations and studies in extension accounted for 19 percent.

Table 2

Dissertation Topics in Agricultural Education by Decades

Dissertation Topics	Pre-1930	1930-1939	1940-1949	1950-1959	1960-1969	1970-1979	1980-1986	Total
International	-	3 6%	-	7 4%	12 7%	45 18%	66 24%	133 14%
Extension	-	1 2%	-	-	2 1%	18 7%	53 19%	74 8%
History and Philosophy	1 3%	2 4%	3 10%	11 7%	2 1%	2 1%	1 0%	22 2%
Adult/Young Farmer/Post Sec.	-	3 6%	2 7%	11 7%	15 8%	29 13%	18 7%	78 8%
Agricultural Mechanics	-	-	-	12 8%	16 9%	26 10%	25 9%	79 8%
FFA	-	-	-	1 1%	-	11 4%	12 4%	24 2%
SOEP	1 3%	2 9%	2 7%	7 4%	4 2%	6 2%	19 7%	41 4%
Teacher Education	6 18%	9 19%	9 31%	32 21%	16 9%	32 13%	20 7%	124 13%
Curriculum/ Program Planning	5 15%	3 6%	2 7%	5 3%	33 19%	30 12%	11 4%	89 9%
Org., Adm. and Supervision	7 21%	5 10%	4 14%	5 3%	8 5%	4 2%	2 1%	35 4%
Teaching	1 3%	-	1 3%	7 4%	16 9%	13 5%	9 3%	47 5%
Professional & General	12 36%	20 42%	6 21%	58 37%	53 30%	39 15%	36 13%	224 23%
Totals	33	48	29	156	177	255	272	970

Percentages are for columns

With a few minor exceptions there does not appear to be a programmatic emphasis in dissertations by institutions. A listing of dissertation topics by the leading universities is found in Table 3. Two universities, the University of Missouri and Oklahoma State, have produced ten or more doctorates in agricultural mechanics. More dissertations on SOEP have been written at Iowa State than any other university. Cornell and Ohio State have produced large numbers of dissertations in teacher education and curriculum/program planning. Ohio State also leads in the number of extension dissertations. When the number of dissertations on any particular topic at a single university are compared with the total number of doctorates produced at that institution, it becomes obvious that even though several dissertations may have been written on a similar topic during a short time period, it hardly constitutes a major institutional research emphasis.

The university that may come the closest to having a programmatic research emphasis is Iowa State. The "Experimental Evaluation of Instructional Techniques" dissertations written at Iowa State during the 1969-1971 era emerged again at Iowa State in the 1980s but the emphasis was slightly different. Six dissertations were written on the evaluation of instructional materials; often dealing with SOEP or youth leadership. Ohio State had five dissertations during the 1950s evaluating teacher education programs. An examination of dissertation titles during the 1930s and 1940s revealed seven dissertations that were concerned with educational programs for the Negro, all written at Cornell. Three dissertations were written at Oklahoma State in 1980-1981 that revolved around a common theme; that of evaluating the instruction, research, and extension function of the Division of Agriculture at Oklahoma State.

One finding the researcher deems important has to do with dissertations on historical topics in agricultural education. Typically, the dissertations documenting the history of the profession were written at non-agricultural universities by people who are not known in agricultural education.

After comparing the types of dissertations with the concerns of the profession by decade the researchers concluded there was some relationship between the concerns of the profession and the dissertations. For example, during the first two decades after the passage of the Smith-Hughes Act there was concern on how to organize programs and curricula and train teachers. These concerns are reflected in the dissertations. The agricultural mechanics component of the program was emphasized during the 1950s and the dissertations reflect that. After the passage of the Vocational Education Act of 1963 there was concern in the profession about how to change the curriculum for off-farm agriculture and this was addressed in the dissertations. The competency based approach to teaching was a concern in the 1970s and the dissertations reflect this. In the later 1970s and early 1980s the profession was advocating a return to the SOEP and this did show up in a number of dissertations.

The primary disparity in the dissertations has been during the current decade. There have been few dissertations addressing the excellence in education movement, the adoption of high technology in agriculture, or the need to readjust agricultural education for the future. There has been a decline in the percentage of dissertations on teacher education, curriculum, teaching, organization and supervision, adult education, and agricultural mechanics during the 1980 decade. By looking at the dissertations during the past six years one would have to conclude that international development and extension education programs are the major concerns of the profession.

Table 3

Dissertation Topics in Agricultural Education by Leading Institutions

Dissertation Topics	CU	UI	ISU	LSU	MICH	UM	OHSU	OKSU	PSU	TAMU	VPI
International	18	8	10	4	5	4	12	18	11	2	-
Extension	1	1	8	3	1	2	23	10	4	1	3
Hist./Philosophy	2	4	1	2	1	-	2	-	2	-	-
Adult/Young/PSec	4	5	6	3	7	10	5	6	9	1	3
Agr. Mechanics	1	3	9	2	3	14	7	13	5	1	2
FFA	-	-	4	1	1	2	5	1	-	2	6
SOEP	7	1	10	3	3	2	7	1	1	1	1
Teacher Educ.	19	8	6	5	5	8	27	3	14	1	1
Curriculum	11	4	5	1	2	2	19	7	10	3	2
Organiz. & Adm.	6	2	-	1	-	2	9	-	1	-	-
Teaching	3	1	8	1	2	5	5	1	10	1	1
Professional & General	31	14	16	14	14	11	38	12	20	6	3

CU is Cornell University, UI is University of Illinois, ISU is Iowa State University, LSU is Louisiana State University, MICH is Michigan State University, UM is University of Missouri, OHSU is Ohio State University, OKSU is Oklahoma State University, PSU is Pennsylvania State University, TAMU is Texas A&M University, VPI is Virginia Tech

CONCLUSIONS AND RECOMMENDATIONS

There have been changes in the institutions that are producing the doctorates. Some universities have emerged and then receded. Other universities have remained fairly constant. During the past 15 years several new universities have starting producing doctorates. Currently no one institution totally dominates the field. There are at least 11 institutions that have an adequate size faculty to offer a quality doctoral program and do produce a respectable number of doctorates. The researcher views this positively as this allows for some diversity in the profession.

A variety of topics in agricultural education have been researched by doctoral students and these topics have changed over the years. The topics being researched are often on problems facing the profession. However, these dissertations are often reactive instead of proactive; they are after-the-fact. Dissertations in agricultural education have not been forward looking. For example Congress said agriculture would change in 1963 and the dissertations after that reflected the change. The dissertations prior to 1963 did not indicate change was needed. Doctoral dissertations in agricultural education tend to emphasize the status quo. There is room for improvement on selecting dissertation topics, especially in the current era.

With a few minor exceptions there appears to be no truly systematic research emphasis by institutions or within the profession. Doctoral research in agriculture education does not appear to have a focus. Over the years several universities have had a series of dissertations on the same general topic. This would appear to constitute a research focus for a university but when one realizes the number of dissertations on the same topic were among a far larger number of dissertations awarded by the institution during the decade, it would be difficult to construe this as a research focus. Additionally, whatever focus there was lasted for only a short time. The researcher lauds the limited efforts that have been done but would encourage the profession to work harder at systematizing the knowledge base of the profession. The researcher is not suggesting that every dissertation from one university should be on the same topic, but there should be more related studies than now exists.

Even though doctoral research in agricultural education was not in as bad a condition as the researcher thought it might be, there is considerable room for improvement. In the future we cannot afford to be a day late and a dollar short. Our research needs to be more systematic and forward looking.

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A DAY LATE AND A DOLLAR SHORT: DOCTORAL RESEARCH IN AGRICULTURAL EDUCATION

A Critique

Alan A. Kahler, Iowa State University -- Discussant

The researcher analyzed an interesting topic and provided an excellent historical overview of doctoral research in agricultural education. The researcher supplied additional information relative to the topic prior to reviewing the paper which was most helpful in interpreting the contents of this paper. The research is to be lauded for his efforts to fully inform this discussant about his research and the paper accepted for this research meeting. It added much to understanding the contents of the paper.

The specific strengths of the paper were: (1) The author further emphasized, through the paper, the need for the profession to focus on topics of a historical nature and provided useful information on how to conduct historical research. (2) The rationale, purpose, objectives, and procedures were clearly stated providing the reader with the necessary background to understand the results presented. (3) Conclusions and recommendations were presented clearly.

Following are perceived weaknesses of the paper. (1) The case was made in the introduction that research in agricultural education should be more systematic in nature and the inference drawn that doctoral research should also be more systematic. While some may hold the view that doctoral research should be more systematic, others believe that it should not. These people believe that doctoral research should be approached more from the perspective of the doctoral candidate and his/her research interests. No mention was made of this other view in the paper. Had the research analyzed doctoral research from this other perspective, the conclusions and recommendations in the paper would have been different. It would seem that systematic (project) research should be more the responsibility of professionals in the field rather than doctoral students who are learning and perfecting their research skills. (2) To suggest that all doctoral dissertations should address significant problems concerning the profession requires explanation. What is a "significant problem" and who decides what is significant? (3) The breakdown of studies completed by program area (Table 2) appeared to overlook one or more important categories; namely, Guidance, Follow-up Studies, and Evaluation. Did studies completed in these areas fall under the categories listed in the table? (4) The assumption that we are "a day late, a dollar short" is questionable. Data presented in the study does not support this assumption.

A DESCRIPTIVE STUDY OF VOCATIONAL AGRICULTURE TEACHERS AND THE DEGREES TO WHICH THEY HAVE ADOPTED RESEARCH VALIDATED TEACHING BEHAVIORS

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INTRODUCTION

The teacher has long been thought to have more influence on student learning than does any other factor associated with learning. Hunter (2) stated that:

> By changing nothing but the ability of the teacher to teach, we can bring about a more dramatic change in the success of a child in learning than through the manipulation of any other factor in his or her environment.

Teachers who are recognized for achieving excellence in their professions tend to be measured against standards designed by other educators and/or administrators which are sometimes based on personal feelings or biases. It would appear that application of research is often ignored in the design of such standards.

Research efforts are beginning to identify some characteristics of effective teaching which tend to contribute to learning, and educational researchers are beginning to find ways to scientifically measure and correlate teaching behaviors and characteristics with teaching effectiveness. A critical need exists at this time to identify "master teachers of vocational agriculture", and to describe them in terms of research based behaviors and characteristics.

PURPOSES AND OBJECTIVES

This study was designed to identify and describe the degrees to which research validated teaching practices have been adopted by secondary teachers of vocational agriculture. Specific objectives are:

1. Identify research validated teacher effectiveness behaviors.
2. Determine the degree to which teachers have adopted the behaviors in their teaching activities.

PROCEDURE

This study was national in scope. Teachers were identified from the list of vocational agriculture teachers published in the 1986 Agriculture Teachers Directory (1). The total population consisted of 10,200 teachers.

An adequate sample size was determined to be 510 secondary vocational agriculture teachers. A substitute procedure as described by Chapman (4,p.46-61) was used for this study.

A stratified random sample was selected by computer using a random number program. A proportionate sample was selected from each state according to the number of active secondary teachers who were engaged in teaching within that state. The computer listed the teachers in the order in which they were selected. Five percent of the population was designated to be the primary sample based on their rankings on the computer listing. The next three and one-half percent of the teachers on the computer list were designated as substitute respondents, and were used only to replace units from the primary sample for which no response was received. Nonrespondents were replaced by substitutes from the same state and/or region (as designated by the national organization of Future Farmers of America organization).

The research instrument used in this study was adapted from an instrument developed by Rheault (6). It was designed to assess the extent to which vocational agriculture teachers used research based teaching effectiveness techniques in their teaching activities. The instrument was validated by mailing it to ten vocational agriculture teachers who were not among those selected as study participants.

Teaching techniques were assessed by asking the teachers to respond to forty statements which described specific teaching behaviors. The respondent was asked to provide information about what he/she actually does while teaching based on a Likert scale from one (Never) to nine (Always). The statements were based on the SIM (3) summary of validated research on teaching effectiveness compiled at Iowa State University.

Data collection commenced September 27, 1986. A follow-up procedure was initiated on October 26, 1986. A letter was sent to all nonrespondents which emphasized the importance of the responses, and requested that teachers complete and return the questionnaires. The number of instruments returned by the 510 teachers who were included in the primary sample was 296 for a response rate of 58.0 percent.

Fifty nonrespondents were randomly selected for a separate follow-up to determine if mean scores of respondents were different from those of nonrespondents. The original instrument was coded and mailed with an accompanying cover letter and self-addressed, stamped envelope on November 20, 1986. Nineteen responses were received from this mailing.

ANALYSIS AND DATA

Forty statements were derived from a list of teaching practices which were research validated by the Iowa State University SIM (School Improvement Model) research project (3) as contributors to effective teaching. The instrument was analyzed for reliability using Cronbach's alpha coefficient of reliability. A strong reliability coefficient of .86 was observed using this procedure.

The decision to use the replacement technique (4) to obtain the desired sample size was based on the assumption that no differences would be found among respondent, replacement, and nonrespondent mean responses to the 40 teaching techniques listed on the survey instrument. The T-test procedure was used for this analysis. Responses were obtained from 296 teachers who were originally identified as primary respondents. In addition, 198 respondents who were selected as replacements were included in the data analyses. Total sample size was 494 teachers. The composition of the sample was 59.9% primary respondents and 40.1% replacements. Nineteen nonrespondents were compared with primary respondents for differences.

Total response scores, mean scores, standard deviations, frequency counts and variable listings for each sample unit and for each of the teaching techniques were calculated using the SPSSx procedure COMPUTE, RECODE, REPORT AND FREQUENCIES.

RESULTS

A t-value of -1.18 (t prob.=24) was observed for the test between group composite mean scores for primary respondents (x=281.59) and replacement respondents (x=283.97). It was further observed that a t-value of .61 (t prob.=.54) was derived as a result of a test between the total sample group mean score (282.55) and the nonrespondent group mean score (278.0).

The first objective of this study was to identify research validated teacher effectiveness behaviors. The SIM (3) research project at Iowa State University was the source of the teaching behaviors used in this study. Each of the effective teacher behaviors which the study identified was referenced to the original research efforts upon which the validation for that behavior was based. Conclusive evidence was available in support of each of the teacher behaviors identified through the SIM project.

The second objective of this study was to determine the degree to which teachers of vocational agriculture had adopted effective teaching behaviors in their teaching activities. The behaviors were classified under five teacher performance areas. Mean scores and standard deviations for each of the instrument items are reported in Table 1.

Table 1. Means and standard deviations of teaching techniques for the total sample studied.

Instrument item	Mean	Standard deviation
	N=494	
Productive teaching techniques:		
Plan and outline your lessons including key points and learning objectives prior to teaching.	6.83	1.54
Encourage students to challenge and discuss relevant issues.	7.24	1.24
Provide written comments when evaluating student performances.	5.98	1.76

Construct tests which measure the student's understanding of the lesson objective.	7.64	1.03
Use learning activities which are designed to achieve the stated objectives for the course.	7.48	1.02
Use a variety of teaching techniques to accomodate differences in student learning styles.	7.30	1.25
Provide learning activities which reflect the abilities of individual students.	6.76	1.25
Provide constructive criticism and positive reinforcement in evaluating the work of students.	7.61	.98
Develop course activities which reflect "lifelike" situations.	7.42	1.12
Select learning activities which supplement established curriculum objectives.	7.22	1.04
Identify student capabilities and seek learning activities which will motivate and challenge them.	6.97	1.10
Accept student performance which you know is below the level of student capability.	2.78*	1.56
Organized, structured, class management:		
Avoid discussions which lead away from the lesson objectives.	6.21	1.55
Require students to make an accounting for the ways they use their time.	5.93	1.89
Start your classes on time.	7.67	1.19
Establish a set of procedures to manage student behavior.	7.79	1.24
Clearly communicate and enforce the expected standards of behavior with all students.	8.01	1.01
Adjust the physical arrangements of the classroom to provide for a variety of learning activities.	7.07	1.54
Use long range plans to guide the improvement of your program.	7.32	1.27

Use the same set of testing materials every year.	2.78*	1.76
Actively supervise learning activites in the shop or laboratory.	8.34	.79
Monitor student use of materials and resources to avoid waste.	7.38	1.24
Adapt readily to changing situations occuring within the classroom environment.	6.92	1.16
Positive interpersonal relationships:		
Motivate students by challenging them to raise their scholastic and personal expectations.	7.55	1.19
Set aside time to provide individual help to students.	7.70	1.04
Experience difficulty with students who do not understand and follow directions.	3.91*	1.61
Critique student work for strengths as well as weaknesses.	6.99	1.22
Professional responsibilities:		
Willingly participate in school activities which require a commitment of your personal time and effort.	7.77	1.28
Participate in teacher inservice activities.	8.18	1.09
Get involved in enforcing school policies and regulations.	7.70	1.38
Willingly participate on faculty committees.	7.31	1.65
Ignore minor violations of school policy and student behavior standards.	2.85*	1.82
Personal characteristics:		
Keep abreast of new developments within your subject matter area.	7.60	1.08
Demonstrate punctuality in your personal work habits.	7.57	1.15
Maintain and use a variety of good references and periodicals.	7.17	1.27

Maintain a clean, tidy personal office or work space.	6.28	1.72
Feel enthusiastic towards your work.	7.57	1.12

*Actual responses before recoding

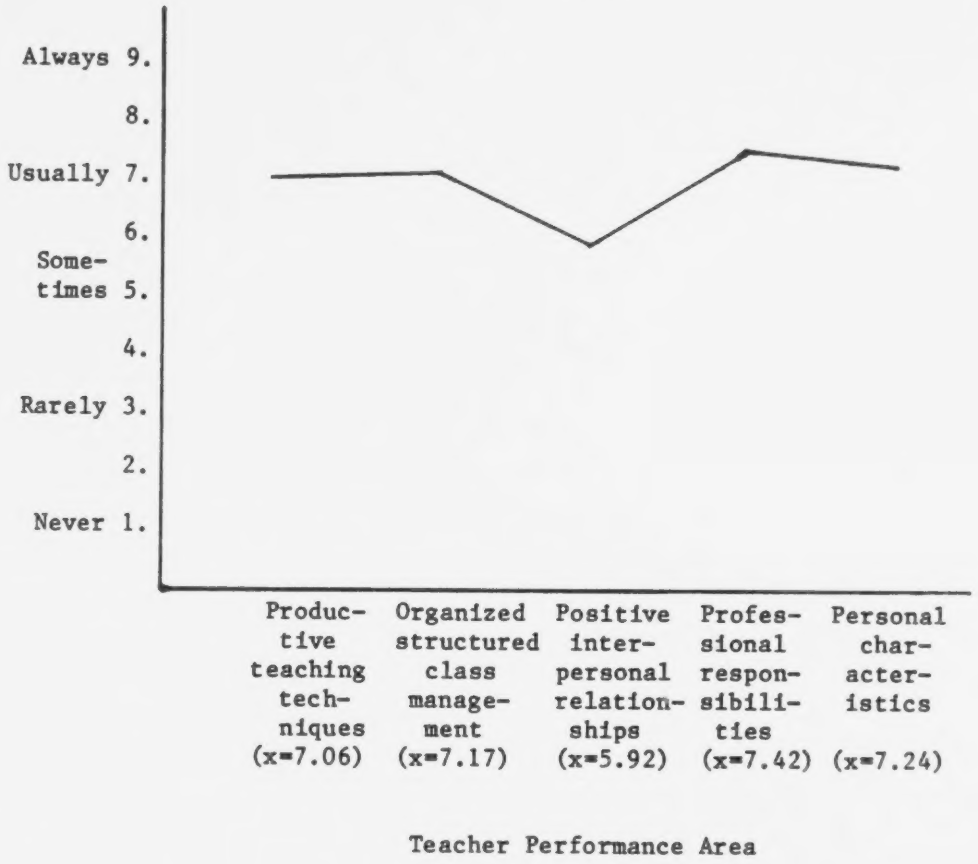

Figure 1. Degree to which teachers of vocational agriculture use effective teaching practices classified under five teacher performance areas

CONCLUSIONS AND RECOMMENDATIONS

Sufficient research evidence is available to identify some effective teaching practices. The Iowa State University SIM project has identified the effective teaching behaviors upon which this study is structured. These behaviors were identified through an extensive search of the literature for sound research efforts which assessed teaching/learning processes. The results included a listing of teacher performance activities which were documented as having positive impacts upon learning by students. Based on the literature review, it is reasonable to expect that these behaviors apply to teaching in the vocational agriculture setting.

The degree to which these positive teaching behaviors were used in the vocational agriculture classroom varied as expected, however on a scale of one (Never) to nine (Always), it was concluded that secondary teachers of vocational agriculture in the United States usually applied the teaching effectiveness behaviors in their classrooms ($x=7.06$, $SD=.549$).

A regional study conducted by Rheault (6) used the teaching performance areas suggested by Manatt and Stow (5). Teachers' mean scores for use of the productive teaching techniques and organized, structured class management measured by this research effort tended to be higher than were those measured by Rheault, but the differences were proportionately the same for each item. The differences may be due to the regional nature (Central Region) of the Rheault study in comparison with the national scope of the current study. Teachers were profiled according to mean score for each of the teacher performance areas. The profile is presented in Figure 1.

Perhaps the greatest weakness of this research was the use of an instrument which gathered data through self-analysis by the teachers. Future research should include the use of a companion instrument to be used by the teachers' administrators and/or peers to eliminate this source of bias.

Teachers of vocational agriculture could benefit directly from this research by using the effective teaching profile as a measuring tool for self analysis. Such a tool used in conjunction with a modified survey instrument designed to assess teacher use of effective teaching techniques could be useful to both individual teachers and to the administrators who supervise them.

Researchers should continue to probe for additional techniques which are associated with effective teaching/learning. Additional studies should be conducted to further refine the teaching techniques into more reliable and stronger measurement tools. Similar studies should be conducted within states to determine strengths and weaknesses of local vocational agriculture teachers in comparison with national and regional norms. Other research should address methods of effectively implementing research findings into the teachers' teaching habits and routines. Implementation of effective teaching practices needs to receive as much attention as does the discovery of new information.

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A DESCRIPTIVE STUDY OF VACATIONAL AGRICULTURE TEACHERS AND THE DEGREES TO WHICH THEY HAVE ADOPTED RESEARCH VALIDATED TEACHING BEHAVIORS

A Critique

Philip Buriak, Mississippi State University -- Discussant

A more descriptive title might have been the degree to which vocational agriculture teachers use (rather than adopt) research validated teaching behaviors (practices, or techniques). Behaviors, practices, and techniques were used interchangeably in the manuscript. Objectives stated behaviors, procedures and tables stated techniques, and other areas of the manuscript stated practices. Definitions would have improved clarity; consistency would have improved confidence in results.

The study assumes that the teacher is the key to student learning. I agree; we all agree. Could this be why only one citation (not in references) was provided in an effort to build a theoretical/conceptual framework.

The study was designed to identify teacher effectiveness behaviors (objective 1) and to determine the degree to which these behaviors were adopted (objective 2). Objective 1 as studied, was not research (Ary, et.al., 1985), rather a requisite review of the literature underlying objective 2.

The 1986 Agriculture Teachers Directory served as the frame. Frame errors due to deaths, retirements, and new teachers could have been minimized by adjusting sample size by the percent probable errors in the frame. Probable errors may have been approximated by state staff members and teacher educators. Substitution procedures were used to insure adequate response size. "Generally, substitution is of little help, and may actually make matters worse" (Kish, Survey Sampling). Thoughtful oversampling could have provided sufficient numbers of respondents without effectively increasing costs. The researchers should be commended however, since the group used as substitutes were randomly selected at the same time as the primary sample, thus minimizing potential selection bias. One additional concern related to sampling; the population was stratified, with proportionate samples selected per state. Substitution for non-respondents was conducted by adding replacements from the same state or region. Why region? Could bias have been introduced?

The instrument was adapted from Rheault, 1985, using statements from the Iowa School Improvement Model (SIM) and validated by 10 vocational agriculture teachers. If the identified behaviors were research validated, was it necessary to revalidate with teachers? With teachers validating the instrument, were the survey statements research based, or were they teacher biased? No *a priori* reliability was reported. Further, data were presented in five dimensions. If calculated per dimension, reliability estimates may have been different than those reported. A non-response sample of 50 was randomly selected as follow-up, with 19 returns. To adequately determine if non-respondents were in fact not different from respondents (as stated), returns from the entire sample of 50 would be a minimum for a population of 10,000. As conducted, the 19 returns were nothing more than respondents from a third mailing.

The major conclusion of the study was that vocational agriculture teachers in the United States adopt teacher effectiveness behaviors in classrooms. I believe the results cannot be generalized beyond the respondents. The researchers pointed out that "the greatest weakness of the study was gathering data through self-analysis by teachers." I concur. I must , however, applaud the researchers for addressing an issue of major importance to the profession. We do have the beginnings of a scientific, research validated basis for teaching. Determining the current use of this science can guide us in our instruction of pre-service and in-service teachers.

AGRIBUSINESS SKILLS REQUIRED BY SECONDARY VOCATIONAL AGRICULTURE STUDENTS AS PERCEIVED BY NEBRASKA VOCATIONAL AGRICULTURE INSTRUCTORS AND AGRIBUSINESS MANAGERS

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INTRODUCTION

The need for expanded instruction in agribusiness was identified as early as the 1960's. Yet today the definition of "agribusiness" remains vague, and quality materials for agribusiness instruction are yet to be developed and implemented in vocational agriculture programs in Nebraska.

The 1963 Vocational Education Act passed by the United States Congress predicted and promoted changes needed for vocational education programs in agriculture. That act encouraged schools to offer vocational instruction for any occupation in agriculture/agribusiness for which there was a need. This was a drastic change from the types of programs in production agriculture which were receiving federal financial support prior to 1963.

Carl Gerhardt (1986), Senior Vice-President of Alfa Laval Inc. of Kansas City stated that vocational agriculture programs in secondary schools were basically geared to train for production agriculture as are most college of agriculture curricula. Gerhardt speculated that though production training must continue, the question must be asked; "where do we train prospective farmers and agricultural businessmen how to thrive/survive in the business world?" The answer to this question is critical if we accept the premise that vocational agriculture teachers must move their primary teaching orientation from production of food and fiber to agribusiness management.

Litzenberg (1987) concluded that any effective agribusiness education program in the future will require a commitment of time and money from public and private agricultural interests. Future educational programs in agribusiness will depend heavily on the educator's ability to develop curriculum and to provide relevant course materials to current instructors of agribusiness education.

It has become the responsibility of agricultural educators to determine agribusiness needs of the present and the future and to revitalize agricultural education for the years ahead. Matteson (1974) stressed, "The development of curriculum which prepares students to enter the occupations of their choices is a major reason for the existence of vocational educators at all levels. The secondary and postsecondary vocational educators are ultimately the ones responsible for the development of appropriate and adequate vocational education curriculum.

PURPOSE AND OBJECTIVES

The primary purpose of this study is to identify agribusiness skills which are required by a student for entry level employment in Nebraska agribusinesses as perceived by Nebraska vocational agriculture instructors and agribusiness managers. The specific objectives of this study were to:

1. Determine differences between skills required for employment in an agribusiness as perceived by Nebraska vocational agriculture instructors and Nebraska agribusiness managers.

2. Determine differences between skills required for employment for each of seven selected types of agribusiness as perceived by Nebraska agribusiness managers.

3. Determine the level of education required for employment in agribusinesses by Nebraska agribusiness respondents.

4. Determine the level of education required for employment in each of seven agribusiness areas.

PROCEDURES

The population for this study consisted of all 128 secondary vocational agriculture instructors in Nebraska and the managers of businesses serving agriculture in the communities which offer vocational agriculture. The initial respondent sample consisted of 36 Nebraska vocational agriculture instructors and 252 Nebraska agribusiness managers located throughout the state.

Three vocational agriculture instructors were randomly selected from each of twelve NVAA districts in Nebraska. The vocational agriculture instructors were contacted and asked to identify names and addresses of managers of seven agribusinesses in their community based on the following criteria:

1. The business should employ at least 10 people.
2. The business should be agriculturally related.
3. The business should provide employment opportunities for secondary and/or postsecondary agricultural graduates.
4. The business should represent one of each of the following agribusiness areas: production agriculture, agricultural supplies, agricultural sales and service, agricultural finance, agricultural mechanics, manufacturing, and horticulture.

The final sample used in the study consisted of 36 vocational agriculture instructors and 180 agribusiness managers.

Sixteen instructional units identified in the Mid America Vocational Curriculum Consortium (MAVCC) guide for teaching Employment in Agriculture (1986) were evaluated to determine the agribusiness competencies and skills which were used in this study. After reviewing the instructional units, 66 specific agribusiness skills were identified and were listed for further evaluation.

Forty-nine agribusinesses across the state were selected from the 1986 Nebraska Business Directory to pilot test the instrument. Recommendations from the pilot survey indicated that the survey format should be changed to identify skills by subject area groupings. Forty survey items were finally identifies for inclusion and divided into six categories of agribusiness skills areas required for a student to obtain employment in an agribusiness, general business skills, sales skills, office equipment skills, communication skills, and customer relation skills.

Information from the pilot study was used to design two different surveys to collect data for this study. The first survey was designed for the agribusiness manager to supply demographic information about their agribusiness and to provide perceptions of the importance of the 40 agribusiness employment competency skills. The second survey was designed for the vocational agriculture instructors to identify information about their vocational agriculture programs and to provide perceptions of the importance of the 40 agribusiness skills for employment.

The instrument was revised and updated following a thorough review by agribusiness persons, graduate students, and faculty members of the University of Nebraska Agricultural Education Department.

The Likert method of Summated Ratings was selected for the evaluation of competencies because of its extensive use in opinion research. A rating scale of 1 to 9 was used to determine the perceived importance of each skill as an employment requirement in an agribusiness. A value of "1" was used to indicate a skill not required for employment in an agribusiness. A value of "3" was used to indicate a skill seldom required. A value of "5" was used to indicate a skill sometimes required. A value of "7" was used to indicate a skill required and a value of "9" was used to indicate a skill as essential.

A mailed survey was used to collect the data for the study. All randomly selected vocational agriculture instructors and identified agribusiness managers received a questionnaire. A cover letter sent to both agribusiness managers and instructors was included with the questionnaire which provided instructions and a brief explanation. All surveys were accompanied by a postage paid self-addressed return envelope.

Nonrespondents were personally contacted and encouraged to participate after two follow-up contacts. Results of a T-test indicated there were no significant differences in responses between the initial respondents and the nonrespondents. The 36 vocational agriculture instructors returned 31 completed surveys and provided a return rate of 86 percent. The 180 agribusiness persons returned a total of 140 completed surveys which provided a 78 percent return rate for the sample population.

Agribusiness managers were further classified in each of the seven major areas of agribusiness for further comparisons of employment requirements within the agricultural industry. Twenty-five respondents were identified in agricultural production, 23 in agricultural supplies, 34 in agricultural sales and service, 30 in agricultural finance, 27 in agricultural mechanics, 24 in manufacturing, and 17 in horticulture.

ANALYSIS OF DATA

-The returned questionnaires were checked for illegible and incomplete data. If respondents failed to complete parts of the questionnaire, it was recorded as "missing data".

-When evaluating the rated skills, the following guidelines were established by the investigators: a score of 1 to 3.99 identified skills that were "seldom" to "never" required. A score of 4 to 6.99 identified skills that were "sometimes required" and a score of 7 or above identified skills that were "required".

-Means, standard deviations and analysis of variance procedures were used for survey items that represented ratings of skills and competencies which were considered important for employment in an agribusiness.

-Frequency distributions and percentages were used to report responses to demographics questions and their relationship to the study.

-Analysis of Variance (ANOVA) was used to reveal differences among specific groups for both demographic and skill data.

-A Tukey post hoc test was used to determine which groups differed significantly through comparison of composite scores.

-A Cronbach Alpha Reliability Coefficient was calculated on both instruments, yielding a value of $r = .94$ on the agribusiness instrument and a value of $r = .95$ on the vocational agriculture instructor instrument.

-An independent T-test was used to determine differences between sample means of primary respondent groups and final nonrespondents. No differences were found.

RESULTS

The following results were observed from the analysis of the study:

1. The agribusiness respondent group identified seven skills as required (7.0 or above on a 9 point scale), for employment in their agribusiness. These skills included the ability to:
    1. get along with people (8.24)
    2. to obtain a social security card (7.98)
    3. use the telephone (7.69)
    4. use the adding machine (7.54)
    5. talk to customers (7.47)
    6. utilize product knowledge for customer relations (7.38)
    7. recognize/help customers (7.11)
2. Agribusiness respondents and vocational agriculture instructors agreed on 5 employment skills identified as being required skills for a student to possess for employment in an agribusiness. These skills included the ability to:
    1. get along with people
    2. talk to customers
    3. use the telephone
    4. use product knowledge for customer relation
    5. recognize/help customers
3. Six skills were observed to have a significant difference at the .05 level, and 30 skills had a significant difference at the .01 level between the perceptions of skills required for employment in an agribusiness by vocational agriculture instructors and agribusiness respondents.
4. Agribusiness respondents identified seven skills as "seldom" or "never" required (3.99 or below) for employment in an agribusiness. These skills included the ability to:
    1. use computer word processing skills (3.86)
    2. calculate profit/loss (3.82)
    3. program a computer (2.56)
    4. prepare a newspaper advertisement (3.52)
    5. select advertising media (3.45)
    6. plan a floor layout (3.38)
    7. determine stock turnover (3.33)
5. Agribusiness respondents identified customer relation skill (6.96), as the most required skill for employment in an agribusiness. Communication

skills (6.24) ranked second in importance followed by skills to obtain employment (5.93).

6. The 15 required skills for employment as identified by respondents in Agricultural Supplies included the ability to:

1. get along with people (8.33)
2. talk to customers (8.22)
3. count change (8.18)
4. use the telephone (8.12)
5. accept credit cards/checks (8.00)
6. use the adding machine (8.00)
7. possess product knowledge for customer relations (7.83)
8. recognize/help customers (7.83)
9. handle complaints (7.72)
10. use cash register (7.41)
11. prepare a sales ticket (7.33)
12. complete an employment application (7.22)
13. close a sale (7.18)
14. possess product knowledge for a sales skill (7.18)
15. order and receive merchandise (7.06)

7. The 12 required skills for employment as identified by respondents in Agricultural Sales and Service included the ability to:

1. get along with people (8.08)
2. use the telephone (8.04)
3. obtain a social security card (8.00)
4. use an adding machine (7.85)
5. utilize product knowledge for customer relations (7.77)
6. recognize/help customers (7.65)
7. talk to customers (7.62)
8. prepare a sales ticket (7.62)
9. possess product knowledge for a sales skill (7.58)
10. complete an employment application (7.46)
11. use a cash register (7.10)
12. close a sale (7.15)

8. The 10 required skills for employment in Agricultural Finance identified by respondents include the ability to:

1. talk to customers (8.30)
2. get along with people (8.26)
3. use the adding machine (8.15)
4. use the telephone (8.07)
5. recognize/help customers (7.82)
6. handle complaints (7.78)
7. calculate interest (7.67)
8. possess product knowledge for customer relations (7.52)
9. introduce yourself and others (7.48)
10. obtain a social security card (7.26)

9. The 16 required skills for employment identified by respondents in Horticulture include the ability to:

1. get along with people (8.86)
2. obtain a social security card (8.57)
3. talk to customers (8.14)
4. utilize product knowledge for customer relations (8.14)
5. use the telephone (8.07)
6. prepare a sales ticket (8.07)
7. recognize and help customers (7.93)

8. count change (7.86)
9. possess product knowledge for a sales skill (7.79)
10. figure sales tax (7.57)
11. use adding machine (7.50)
12. use cash register (7.43)
13. introduce yourself and others (7.43)
14. close a sale (7.29)
15. handle complaints (7.20)
16. accept credit cards/checks (7.07)

10. Composite scores of all skill areas indicated that selected agribusiness respondents valued student employment skills differently.

1. Agricultural Supplies (6.30)
2. Agricultural Sales and Service (6.25)
3. Agricultural Finance (6.16)
4. Horticulture (6.02)
5. Agricultural Mechanics (5.45)
6. Manufacturing (5.02)
7. Agricultural Production (3.06)

11. Customer relation skills was the only skill area reported as required (7.0 or above) for employment in some agribusiness areas. Those areas included agricultural supplies (7.80), agricultural sales and service (7.46), agricultural finance (7.70) and horticulture (7.76) .

12. Education requirement data indicated that 64% of the agribusiness respondents hire current high school graduates only "sometimes".

13. Sixty-seven percent of the agribusiness respondents reported that they "seldom" or "never" require a student employee to have been enrolled in vocational agriculture for employment in their agribusiness.

14. Manufacturing (88%) and Horticulture (86%) respondents rated vocational agriculture as "seldom" or "never" required for employment in their agribusiness.

15. Sixty-one percent of the respondents from agricultural supplies rated vocational agriculture as "always" or "sometimes" required for employment in their agribusiness.

16. Postsecondary training was required for employment primarily in agricultural finance and agricultural sales and service.

CONCLUSIONS AND/OR RECOMMENDATIONS

The following conclusions were drawn from the findings of this study:

1. The majority of employment skills and competencies currently provided in instructional materials used in Nebraska vocational agriculture programs were rated as only "sometimes required" or "not required" by agribusiness managers.

2. Agribusiness managers rated all skills consistently lower and did not require as many skills to gain employment when compared to vocational agriculture instructors.

3. Customer relation skills and communication skills were the most required skill categories identified by Nebraska agribusiness managers.

4. Agricultural Sales and Service, Agricultural Supplies, Agricultural Finance, and Horticulture respondents identified more skills as being required for employment in an agribusiness than respondents from Agricultural Mechanics, Manufacturing, and Agricultural Production.

5. Agribusiness managers do not rely on vocational agriculture programs as a source of new employees.

6. Agricultural Supplies, Agricultural Sales and Service, Agricultural Finance and Horticulture respondents rated the customer relation skill area as the only agribusiness area required for employment in their agribusiness.

7. Agricultural Production and Manufacturing respondents identified the least amount of required skills for employment in their agribusinesses.

As a result of the conclusions drawn from this study, the following actions were recommended:

1. Curriculum materials used to provide agribusiness instruction in Nebraska should be reviewed and updated to eliminate inappropriate materials. Required employment skills should be identified and instructional materials developed to meet the needs of the agribusiness employer. Agribusiness persons and vocational agriculture instructors should work cooperatively in this task.

2. Vocational agriculture instructors should identify employment needs of agribusiness firms in their community and provide the instruction needed to address those needs.

3. Vocational agriculture instructors and local agribusiness persons should promote opportunities for students to improve the communication skills needed to gain employment in an agribusiness.

4. Agribusiness curriculum materials need to be emphasized in the following agribusiness areas in Nebraska: Agricultural Sales and Services, Agricultural Supplies, Agricultural Finance, and Horticulture.

5. Vocational agriculture instructors need to work closely with local agribusiness managers to identify skills required for employment, provide opportunities for the placement of students, and to inform local agribusiness persons about potential benefits of hiring students with proper vocational agriculture training.

6. Customer relations skills and communication skills should be taught in all vocational agriculture programs with agribusiness in the curriculum.

7. Career objectives should be identified early to provide the vocational agriculture student the greatest opportunity for agribusiness skill development prior to graduation from high school.

8. Additional research should be conducted to determine what actual skills and competencies are currently required for employment in agribusiness. The last national competency study was completed during the years 1975 - 1978,

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AGRIBUSINESS SKILLS REQUIRED BY SECONDARY VOCATIONAL AGRICULTURE STUDENTS AS PERCEIVED BY NEBRASKA VOCATIONAL AGRICULTURE INSTRUCTORS AND AGRIBUSINESS MANAGERS

A Critique

John Hillison, Virginia Tech -- Discussant

The introduction included a theoretical base that emphasized the national situation with reference to agribusiness. The theoretical base emphasized an association between the agricultural education curriculum and agribusiness. This point tied the two groups surveyed together very nicely.

The sampling procedure used was a sound one, especially the one used to select teachers. By going to all NVAA districts a total state-wide perspective was achieved.

The instrument development procedure followed a logical step by step process. Validity was insured by using the Mid America Vocational Curriculum Consortium guide. Reliability was measured and reported. The instrument was field tested with an appropriate peer group. Sound statistical procedures were used to analyze the data. The response rate was satisfactory.

While the theoretical base covered national trends and concerns in agribusiness, it did not discuss the situation in the state where the data were collected. Why was Nebraska selected as the state for data collection? What part of the present Nebraska curriculum in agricultural education prepares students for agribusiness?

The sampling procedure for selecting the agribusiness managers was not quite as sound as the one for selecting teachers. I would think it difficult to find seven agribusinesses in each rural Nebraska community that could meet the established criteria of at least 10 employees. Is that why the theoretical sample of agribusiness managers dropped from 252 to an actual sample of 180? Consider what that does for the response percentage if the sample is defined as 252.

What is the basis for the seven agribusiness categories? Is the basis federal, state, or researcher developed? Is a plant nursery a supplier, sales and service, or horticulture? We need a bit more information on this point.

The results indicated a strong need for people oriented skills. The need to "get along with people," "use the telephone," and "talk to customers" have been stated by employers for years. Other affective skills employers have emphasized include "getting to work on time," "getting along with other employees," and "giving a day's work for a day's pay." My question is when are we going to pay attention to the need of emphasizing these affective skills in the agricultural education curriculum?

One last point on the bibliography. The basis for the instrument was the Mid American Vocational Curriculum Consortium guide. It should have been in the bibliography. The overall style used was more APA than anything else. However, it needs polish, especially if the manuscript will be submitted to The Journal of AATEA.

In conclusion, this is a well conducted study and a topic worth examining. I find it interesting in the excellence era, which has really become the cognitive era, that affective skills are so very important. It is also interesting to note that agricultural educators think more of our own curriculum than do the people who hire our products. My question is - when are we going to pay attention to what they say?

A PROFILE OF WOMEN AGRICULTURAL SCIENTISTS IN U.S. LAND-GRANT UNIVERSITIES

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INTRODUCTION

The representation of women in the scientific and engineering professions has been low, and the agricultural sciences have been particularly difficult areas for women to enter. In 1984, Vetter found high unemployment rates for women in the agricultural sciences at all degree levels. Specifically, in colleges of agriculture, the representation of women among agricultural scientists is low. Currently, women agricultural scientists at the 70 U.S. Land-grant universities comprise 4.6% of the total agricultural faculty (Henderson & Cooper, 1987).

A recent study (Henderson & Cooper, 1987) provided information on the numbers of women faculty in U.S. Land-grant colleges of agriculture. Seventy percent of the colleges have between one and 20 women agricultural scientists. The highest number of women agricultural scientists employed in any one college is 27. In relation to the total population of women agricultural scientists, the crop and soil science discipline has the highest number of women scientists (19%). The agricultural engineering discipline has the fewest number of women scientists (1%). There is a low representation of women agricultural scientists in all geographic regions of the U.S.

More women are pursuing degrees in science, and these graduates constitute the youngest, more-recently trained scientists in their disciplines (Hornig, 1984). However, little is known about the professional characteristics and responsibilities of women scientists working in an academic setting. Most current research examines sex discrimination, sex role stereotypes, and sex biases (Butler & Marzone, 1980). However, Dresselhaus (1984), stresses the importance of studying the responsibilities of women scientists. Specifically, she studied the responsibilities of women faculty in engineering schools. With regard to women in the agricultural sciences at universities, little descriptive information is available.

PURPOSE AND OBJECTIVES

This research effort was the first national study to focus specifically on women agricultural scientists in academic settings. The main purpose of the study was to characterize women scientists in colleges of agriculture at the 70 Land-grant universities in the United States. Specifically, the study of women agricultural scientists was designed to investigate the following research objectives:

(1) to describe their academic background and current positions;
(2) to describe their teaching, research, and service responsibilities; and
(3) to provide demographic data.

PROCEDURES

For purposes of this study, women agricultural scientists were defined as faculty members in colleges of agriculture with academic, tenure-accruing appointments in the following nine disciplines: animal science, crop and soil science, agricultural economics/rural sociology, agricultural engineering, natural resources/forestry, biological sciences, horticulture, agricultural and extension education, and food science/animal nutrition.

To develop a comprehensive list, associate deans in colleges of agriculture at Land-grant universities were asked to provide the names of women scientists with academic, tenure-accruing appointments in their colleges of agriculture for the 1985-86 academic year. A 100% response rate from the deans was achieved and resulted in a list of 514 women faculty in the agricultural sciences. Stratified random sampling techniques incorporating the 70 Land-grant universities were employed to obtain a representative sample of 218 women scientists (Cochran, 1977). This technique insured faculty representation from each Land-grant university that reported having women agricultural faculty.

A research questionnaire was designed specifically for use in this study. The questionnaire had five sections: educational and professional background, job responsibilities, career perceptions, self-perceptions, and personal data. Both open- and close-ended questions were used to gather the research data. Content validity of the questionnaire was established by a panel of experts consisting of agricultural education faculty, college administrators, and women scientists in the biological/physical sciences at The Ohio State University. A pilot test was conducted among women faculty in engineering and the physical sciences at The Ohio State University. Reliability coefficients (Cronbach's alpha) of .71 to .90 were obtained for the Likert-type scales used in the questionnaire.

During the first week of April 1986, a cover letter, questionnaire, and self-addressed, stamped envelope were mailed to the women scientists in the sample. A second mailing of the questionnaire was sent to all non-respondents during the first week of May 1986. The third and final mailing of the research questionnaire was sent during the fourth week of May 1986. Usable questionnaires were returned by 157 women scientists resulting in a 72% response rate. The responding sample included women agricultural scientists from 52 Land-grant universities throughout the United States.

The returned questionnaires were divided into two groups, those responding before and those responding after the third follow-up letter. The two groups were compared statistically to determine whether early respondents were different from late respondents. Based on a Chi-square test for independence, early respondents appear to be no different from late respondents on the variables included in the study. Assuming that late respondents are like non-respondents (Miller & Smith, 1983), the results of the study were generalized to the population.

During November 1986 to April 1987, personal interviews were conducted with 15 of the women scientists who were in Ohio and the five neighboring states. These scientists were selected from the original sample by analyzing their responses to the questionnaire and identifying women who represented the various academic ranks, disciplines, ages, and marital status of the target population. These interviews allowed for more in-depth questions about the career patterns and career satisfaction of women agricultural scientists.

RESULTS

Results of the study provide a profile of women agricultural scientists regarding their: a) academic background and current position, b) job responsibilities, and c) personal characteristics. Selected anecdotes from the personal interviews highlight their career entry, advancement, and satisfaction.

Academic Background/Current Position

The 157 women represent all nine academic disciplines. Twenty-three percent of the women are faculty members in the crop and soil science discipline, 15% are in the animal sciences, 14% in horticulture, 12% in agricultural economics/rural sociology, 12% in the food science/animal nutrition, 12% in the biological sciences, 8% in natural resources/forestry, 3% in agricultural and extension education, and 1% in agricultural engineering. Nine out of ten women faculty have a doctoral degree. The data reveal that one half (52%) of the women faculty are assistant professors, 32% are associate professors, and 16% are full professors. Fifty percent of the women in the responding sample have been in their current positions for three years or less. Forty-six percent of the women indicate that they have tenure and that receiving tenure had taken an average of six years. Over two-thirds (70%) of the women are on 12-month academic appointments. The women indicate that they work in academic departments with an average of 24 faculty members. They also report an average of three women faculty per department. Thirty-five percent of the women reported that they are the only women in their department.

Teaching, Research, and Service Responsibilities

Forty-nine percent of the women indicated that they teach neither undergraduate nor graduate courses. The women faculty with teaching responsibilities teach an average of one undergraduate and one graduate course per year. They spend an average of seven hours per week in preparation for teaching and devote a total of nine hours per week to lecture, laboratory, and supervision responsibilities. The women have an average of seven undergraduate advisees and are the major adviser for one masters student and one doctoral candidate. However, 44% of the women reported that they have no undergraduate advisees, 37% have no masters students, and 48% have no doctoral candidates.

The women scientists indicated that they are currently conducting an average of three research projects in addition to directing graduate student research and have directed an average of three funded research projects during the past five years. Only 9% of the women are not currently involved in a research project. Eighty-eight percent of the women have published refereed journal articles during the past five years. The women have published an average of seven journal articles during that five-year period. They have presented an average of seven papers at professional meetings during the last five years and have written an average of one book chapter and three research bulletins. Twelve percent of the women in the sample have written a textbook.

In response to questions about membership on committees, the women reported that they serve on an average of three departmental, one college and one university committee. One third (33%) of the women state that they do not serve on any college committees, and 46% serve on no university committees. Forty-seven percent of the women hold leadership positions on departmental committees, 17% report that they hold leadership positions on college committees, and 12% have a leadership role on university committees. On the average, the women scientists are members of two state, four national, and one international professional organization. Twenty-three percent of the women hold leadership positions in state organizations, 29% have a position of leadership in national organizations, and 7% have a leadership position in international organizations. Twenty-two percent of the women responded that they are a faculty adviser for a campus student organization. They reported that the average number of students involved in those organizations is 55. Forty-eight percent of the women advisers rated their level of responsibilities to those organizations as low (one hour or less per week).

Personal Characteristics

Demographic data were collected on the sample of women agricultural scientists. The average age of the women is 39 years, with a range of 27 to 67 years. Ninety-five percent of the women scientists are white, non-Hispanic. Eighty-one percent of the women have a salary between $30,000 and $45,000. Only 8% of the women earn less than $30,000. Two of the women earn more than $60,000 per year in non-administrative positions. Sixty percent of the women are married, and 42% have children. The average number of children is two. Twenty-seven percent of the women scientists have never been married. Over one half (52%) of the women were raised in a metropolitan area, while 16% spent their childhood on a farm. Three-fourths of the women indicated that they had not participated in any agricultural youth organizations, while 20% responded that they had been in 4-H.

Anecdotes From Personal Interviews

When the scientists were asked in the personal interviews what influenced them to enter their field of study, the two most frequent responses were personal interest and encouragement from others. One scientist remembers growing up in an area where the environment was polluted. "I became interested in water quality at a very young age. Now, I'm an agricultural engineer and work in the environmental sciences." A woman entomologist agreed that her childhood experiences affected her career choice. "As a child I was interested in rock and insect collecting. From the time I was 7 years old I knew what I wanted to do." Personal encouragement to pursue graduate education came from a variety of people. The majority of the women said a university faculty member had provided the stimulus needed to consider and continue doctoral study. One woman recalls "My university professor gave me a sense that I could achieve my goals; he had faith in my abilities." Several of the women cited their high school science teacher as the catalyst for pursuing a scientific career. Other women said their mothers had been the most influential person in cultivating their career. One woman remembers "my mother taking me to the science fairs each year and allowing me to have a lab at home when I was young."

Most of the women said they chose an academic career because they enjoy teaching and being with students. One professor said, "I feel that an academic career is the most privileged job possible." Freedom to pursue research interests was also a reason several women chose an academic career. The scientists felt a career in government or industry was restricting because "there is no freedom to choose research topics."

When asked the most challenging aspect of their current position, most of the women said time management. The women felt they were on too many committees and that they could not balance these responsibilities with teaching and research. Some of the women found meeting their personal and family needs, as well as their professional duties and ambitions, to be very difficult. One woman said, "I lost my first marriage after 10 years. I was married to a non-scientist, traditional male. I had to devote my time to my career and our paths diverged." Another woman said, "Being single is tough. I haven't been able to keep a relationship because of my career. I need someone who can handle my career commitment." Another woman felt she could balance her professional career and personal life. "I have a family and a home. I haven't made any tremendous sacrifices. I had to put things off. You can have it all, but not at the same time."

CONCLUSIONS

An analysis of these data presents a clear profile of the women working today in the agricultural sciences at U.S. Land-grant universities. The typical woman agricultural scientist in this sample is white, in her thirties, married, raised in a metropolitan setting, and earns between $30,000 to $45,000 a year. The woman agricultural scientist of today has her doctorate. If she has tenure, she received it in six years. She is just as likely to teach undergraduate and graduate courses as not to teach at all. Presently, she is conducting three research projects and has directed an average of three funded projects in the last five years. Also, during that time, the average woman agricultural scientist has published seven refereed journal articles and has presented seven papers at professional meetings. She is likely to serve in a leadership position on departmental committees but not on college or university committees.

This profile of the woman agricultural scientist gives meaning to the available statistical data. While women may be under-represented on college of agriculture faculties, they do represent a young, dynamic, and successful group of scientists on those faculties. This profile will be meaningful to agricultural administrators in understanding the demographics of their own faculty and of college of agriculture faculties nationwide. More importantly, this profile will be meaningful to the 4.6% women on agricultural faculties in U.S. Land-grant universities. Many of these women serve in departments in which they are the only women. In this profile, they will recognize themselves and learn about their colleagues across the country.

Recent statistics from the U.S. Department of Agriculture show that there is room for women in agricultural fields (Coulter, Stanton, & Goecker, 1985). These data indicate that there are more employment opportunities for agricultural scientists and engineers than there are graduates available for those jobs. Another research organization, however, has issued a warning about employment opportunities for women in the sciences. In a recent issue of Mosaic, the publication of the National Science Foundation, Betty Vetter states that opportunities for women in the sciences may have reached their peak and will now begin to drop significantly (Vetter, 1987). Vetter says that the professional community of scientists and engineers has done little to welcome women into its fraternity.

If women are to maintain what advancement they have made in the sciences, recruitment and retention of young women into science and agriculture must become a high priority. Much current research describes the development of and factors affecting girls' attitudes about science and scientific careers. Specifically, researchers cite the importance of teachers', counselors', and parents' attitudes toward science classwork as being crucial factors affecting girls in science (Matyas, 1985). Case studies show that teachers, using unique instructional materials or techniques, are highly successful in encouraging girls in school to become women in science (Kahle, 1985). Clearly, awareness of the possibilities available in scientific careers is the essential first step in recruiting and retaining women in the agricultural sciences.

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A PROFILE OF WOMEN AGRICULTURAL SCIENTISTS IN U.S. LAND-GRANT UNIVERSITIES
A Critique

Jeffrey W. Moss, Louisiana State University -- Discussant

The authors of this research paper are to be commended for conducting a national study, the first national study to focus on women agricultural scientists in academic settings. What they discovered as a result of their research, "currently, women agricultural scientists at the 70 U.S. land-grant universities comprise 4.6% of the total agricultural faculty," does not merit a similar commendation.

Strengths of the Research Paper. The introduction to the study adequately describes the known current status of representation of women in the sciences and more importantly makes the case that further investigation is needed. Since little, if any, prior research had been conducted in this area, Drs. Henderson and Cooper quite appropriately chose to conduct a descriptive study.

The objectives of the study provide valuable information which was then used to construct a clear profile of the typical woman working in the agricultural sciences at U.S. land-grant universities. The objectives adequately accomplished that purpose.

The description of the procedures used in the conduct of the study are exemplary. I choose the word exemplary purposely because the explanation of the procedures is deserving of imitation and should be used as an example for graduate students as well as some of the rest of us to follow. You have done an excellent job in selecting and describing the methodology used in conducting the research.

The findings of the study are presented for each objective and adequately describe the characteristics of the sample of women scientists. While I did not see a direct connection between the anecdotes from personal interviews and the objectives of the study, I feel they added significantly and were most interesting.

Appropriate conclusions were made based on the findings and presented in an interesting manner by constructing a profile. I agree that the profile gives meaning to the available statistical data.

Recommendation for a Related Study. I was somewhat surprised at seeing no specific recommendations in this paper. Almost without fail, we typically suggest at the very minimum a recommendation for further research. Since you didn't, I will propose one. I think it would be interesting to select a "matched sample" of male counterparts (similar basic demographics in terms of age and tenure in the profession) and collect information on such things as teaching, research, and service responsibilities. I would then like for you to compare the responses from the two samples to discover similarities and differences. The results would be very informative and, I suspect, most interesting.

ASSESSMENT OF PRESERVICE PREPARATION BY RECENT GRADUATES OF AGRICULTURAL EDUCATION PROGRAMS

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INTRODUCTION

Preservice teacher education in agriculture continues to expand with respect to the number of components it includes as it adjusts to the demands of a continually changing world of agriculture (Stitt, 1970) and to the changes in the role of the educator. Critical roles for the vocational agriculture teacher demand numerous competencies. These competencies derive from the three basic dimensions of the preservice preparation program: general education, technical agriculture education, and professional education (Osborne, 1982). A program that is an "appropriate mix" of all three dimensions should be capable of preparing a competent and effective agriculture teacher.

In assessing the quality of teacher education programs, it is important to recognize that there is often a difference between perceived and performed roles of the teacher. Perceived roles are regarded as those roles the teacher believes that he/she must assume on the job prior to job entry. They arise from the curriculum goals and objectives of the preservice preparation program. Performed roles, by contrast, are those roles the vocational agriculture teacher actually does assume on the job. Unfortunately, there often exists incongruities between the two different types of roles. One possible explanation for this apparent incongruence is inadequacies in the preservice program that prepares the teacher. Therefore, an assessment of this preservice program should prove beneficial in attempts to provide better prepared vocational agriculture teachers.

PURPOSE AND OBJECTIVES

The primary purpose of this study was to ascertain the perceptions of teachers of vocational agriculture in Louisiana relating to the quality of their preservice preparation in agriculture. In this investigation, the principal goal was to determine the "what should be" of preservice teacher education in agriculture. In order to achieve this goal, the following specific objectives were formulated:

1. To identify those competencies vocational agriculture teachers perceived they acquired from their preservice training programs.
2. To identify those competencies vocational agriculture teachers perceived they should have acquired from their preservice training programs.
3. To determine the discrepancy between acquired and desired competencies as perceived by vocational agriculture teachers.
4. To identify major curricular areas of preservice teacher education perceived by vocational agriculture teachers to be in need of change.

PROCEDURES

The population of this study included all Louisiana vocational agriculture teachers with five years or less teaching experience who had obtained at least one of their degrees from one of the agricultural teacher education programs in Louisiana. Sixty-one teachers were identified. Since this population size was small, a census survey was conducted. An instrument was developed by the researchers using a "multiple-response design" (Witkin, 1984). Content validity was established through a review by a panel of experts. The instrument utilized six-point scales which addressed competency needs of the beginning vocational agriculture teacher, competencies the respondents attained in their preservice program, and needed improvements in these programs (Cottrell, et al, 1972).

After three mail-outs and two reminders, a total response of fifty-four (88.52 percent) was achieved. All the cases were usable.

Cronbach's alpha reliability coefficients for the scales utilized ranged from a=.82 for the perceived technical competence attained scale to a=.97 for the perceived professional competence need scale.

ANALYSIS OF DATA AND RESULTS

Teachers were asked to indicate the primary activities they conducted as part of their vocational agriculture program. Nearly all the teachers reported they conducted shop and laboratory ($\underline{n}$=53), Supervised Occupational Experience Programs ($\underline{n}$=52), and Future Farmers of America ($\underline{n}$=51) activities. Three of the remaining four areas were reported by less than 50% of the vo-ag teachers. Two of these were programs for young and adult farmers ($\underline{n}$=17) and for special needs students ($\underline{n}$=17). (See Table 1)

Table 1
Program Activity Currently Conducted by Vocational Agriculture Teachers

Activity	N	Percent[a]
Shop and Laboratory Activities	53	98.1
Supervised Occupational Experience Programs, SOEP	52	96.3
Future Farmers of America, FFA	51	94.4
Advisory Council Activities	29	53.7
Cooperative Agricultural Education, CAE	26	48.1
Adult and Young Farmer Programs	17	31.5
Programs For Special Needs Students	17	31.5

[a] Each percent is expressed on a "Yes - No" scale. Only the "yes" responses are reported in this table.

PERCEIVED COMPETENCY NEEDS

All 48 of the professional competency needs of the vo-ag teacher were rated as moderately needed ($\bar{x}$=4.00) or higher. Of these, 23 had mean ratings of 5.00 (substantial need) or higher. The five highest rated items are presented in Table 2.

The three highest mean ratings were: ability to motivate students' interest in the FFA ($\bar{x}=5.39$); ability to demonstrate regard for and interest in students as individuals ($\bar{x}=5.36$); and ability to dispense approved disciplinary measures if and when necessary ($\bar{x}=5.32$).

Table 2
Perceived Professional Competency Needs of Beginning Vocational Agriculture Teachers

Rank	Competency	N	Mean Rating[a]
1.	Motivate in students, interest in FFA	52	5.39
2.	Demonstrate a regard for, and interest in, students as individuals	53	5.36
3.	Carry out approved disciplinary action when warranted	53	5.32
4.	Determine student needs and interests	53	5.30
5.	Formulate and uphold acceptable standards of student behavior in classroom and laboratory	53	5.30

[a] Scale ranged from 6=Great Need to 1=No Need

Of the seven technical agriculture competency clusters identified, five had mean ratings greater than 5.00 (substantial need). The three areas with the highest ratings were: agricultural mechanics and mechanization ($\bar{x}=5.48$); crop sciences ($\bar{x}=5.30$); and animal science ($\bar{x}=5.28$) (See Table 3)

PERCEIVED COMPETENCY ATTAINMENT

Teachers were asked to rate the level of attainment of the 48 professional competencies resulting from their preservice preparation. For each competency, attainment was rated lower than need. These mean ratings ranged from a high of 4.67 to a low of 2.30.

Eighteen of the 48 professional competencies had mean ratings of 4.00 (moderate attainment) or higher. Twenty-nine competencies were rated 3.00 (some attainment) but less than 4.00. Only one competency had a mean rating of "little attainment" ($\bar{x}=2.30$). The three highest mean ratings were: ability to introduce a lesson ($\bar{x}=4.67$); ability to maintain ethical and professional standards ($\bar{x}=4.63$); and ability to write lesson plans ($\bar{x}=4.62$). The five highest perceived professional competency attainments are presented in Table 4.

Competency attainments for the technical agriculture competency clusters are presented in Table 3. Responding teachers perceived their highest attainment to be in the area of animal science ($\bar{x}=4.63$) and their lowest attainment in the area of high technology as applied in the agriculture industry ($\bar{x}=3.15$).

Table 3

Perceived Technical Agriculture Competency Needs, Attainments, and Discrepancies of Beginning Vocational Agriculture Teachers

Technical Area	N	Mean Rating Need Level[a]	 Attainment Level[b]	Discrepancy Value[c]
Possess knowledge and skills in agricultural mechanics, mechanization, and engineering (i.e. arc welding, woodwork, electricity, small engined, tractors, etc.)	54	5.48	4.02	1.46
Possess knowledge and skills in crop science (e.g. horticulture, grain crops, turf grass, forages, etc.)	54	5.30	4.50	.80
Possess knowledge and skills in animal science (including livestock, poultry)	54	5.28	4.63	.65
Possess knowledge and skills in soil science (e.g. soil formation, classification, fertility, management, etc.)	53	5.25	4.53	.72
Possess knowledge and skills in agribusiness/ farm management (e.g. financial planning, marketing, etc.)	54	5.00	3.50	1.50
Possess knowledge and skills in the use and conservation of wildlife, natural resources, energy use and conservation	54	4.96	3.65	1.31
Possess knowledge and skills related to high technology as applied in the agriculture industry	54	4.83	3.15	1.68

[a] Scale ranged from 6 = Great need to 1 = No need
[b] Scale ranged from 6 = Great attainment to 1 = No attainment
[c] Discrepancy value=Perceived degree of need - perceived level of attainment

Table 4
Perceived Professional Competency Attainments of Beginning Vocational Agriculture Teachers

Rank	Competency	N	Mean Rating[a]
1.	Introduce a lesson	52	4.67
2.	Maintain the ethical and professional standards expected of the vocational agriculture teacher	54	4.63
3.	Write a lesson plan	53	4.62
4.	Select teaching techniques and tools and equipment for a lesson	53	4.51
5.	Summarize a lesson	53	4.53

[a] Scale ranged from 6=Great Attainment to 1=No Attainment

NEED-ATTAINMENT DISCREPANCIES

Numerous discrepancies existed between perceived competency needs and competencies attained as a result of the undergraduate preparation. The maximum discrepancy value, d, was 5.00 (6.00 - 1.00). Two d-values of the professional competencies were greater than 2.00, 23 values between 1.00 and 2.00, and 23 had values of less than 1.00. The two items with the largest discrepancies were: use and maintain high technology equipment and materials (d=2.30) and preparation of FFA, VEDS, and travel reports for the state and national officer (d=2.15). The item with the lowest discrepancy value was identify role and function of and establish criteria for selection of advisory council members (d=.15). Table 5 contains the items with the five highest and lowest discrepancy values.

Discrepancy values for the seven technical agriculture competency clusters were relatively smaller than those for the professional competencies. The largest d-value of 1.68 related to the knowledge of and skills in use of high technology in agriculture and the smallest related to animal science competencies (d=.65). These discrepancies are presented in Table 3.

RECOMMENDED PROGRAM CHANGES

Respondents were asked to recommend changes that they felt would improve the preservice program in the areas of general, technical, and professional education. They were requested to address needed changes in two areas: (1) Changes in content related to increasing or decreasing the scope and depth of courses in each area; and (2) Changes in instruction related to the need for improved quality of instruction. These data are presented in Table 6.

General Education. Recommendations for content ranged from some decrease to some increase. No areas were perceived to be in need of great changes. Regarding needed improvements in quality of instruction, all recommendations were in the range of some to moderate improvement needed. The area perceived to be most in need of improvement was computational skills and abilities ($\bar{x}$=3.89). (See Table 6)

Table 5
Discrepancy Values Between Perceived Professional Competency Needs and Attainment of Vocational Agriculture Teachers

Rank	Competency	Discrepancy Value[a]
Five highest items:		
1.	Use and maintain high technology equipment and materials (micro-computers and word processors)	2.30
2.	Prepare state and national reports for FFA, travel, etc.	2.15
3.	Plan, develop, and use personal and professional time effectively	1.93
4.	Devise, use, and maintain an information storage and retrieval system (e.g. filing or computerized system)	1.89
5.	Prepare and use priority list for purchasing equipment and supplies	1.61
Five lowest items:		
44.	Maintain the ethical and professional standards expected of the vocational agriculture teacher	.56
45.	Summarize a lesson	.48
46.	Plan, organize, conduct, analyze, and use community surveys	.46
47.	Write a lesson plan	.46
48.	Identify role and function of and establish criteria for selection of advisory council members	.15

[a] Discrepancy values=Perceived Degree of Need - Perceived Level of Attainment

Technical Agriculture Education. All technical areas were perceived to be in need of some increase in scope and depth except agricultural engineering/mechanics which was rated as needing substantial increase ($\bar{x}$=4.56). All recommendations regarding quality of instruction were in the some to moderate range of needed improvements. (See Table 6)

Professional Education. All professional areas were perceived to be in need of some increase in scope and depth. In addition, one area, "High technology applied to vocational agriculture" was perceived to be in need of substantial increase ($\bar{x}$=4.74).

All of the professional areas were, similarly to the general and technical areas, perceived to be in need of some to moderate increase in quality of instruction. The area receiving the highest rating of need improvement was "High technology applied to vocational agriculture" ($\bar{x}$=4.00).

Table 6

Mean Ratings of Undergraduate Competency Clusters Perceived As in Need of Content Change and Improvement in Quality of Instruction

Competency Cluster	N	Content Change[a]	Instruction Quality Improvement[b]
I. General Education			
Computational skills and abilities (examples - mathematics, computer science, etc.)	54	3.89	3.89
Abilities, skills, competencies in clear and logical thinking	53	3.57	3.19
Communicative skills and abilities (examples - speech, technical writing, etc.)	54	3.43	3.33
Knowledge and abilities related to and use of the democratic process	52	3.23	3.15
Social and human sciences (examples - sociology, psychology, political science, anthropology, etc.)	54	2.85	2.94
II. Technical Agriculture			
Agricultural engineering/mechanics	52	4.56	3.85
Environmental and conservation sciences (energy, natural resources, and wildlife)	53	4.13	3.55
Plant-related sciences	53	3.94	3.34
Animal-related sciences	53	3.83	3.25
Agribusiness-related sciences	53	3.81	3.55
Soil sciences (courses in weed science, soil physics, chemistry, microorganisms, fertility, and management)	53	3.77	3.38
III. Professional Education			
High technology applied to vocational agriculture (e.g. word processors, micro-computers, etc.)	53	4.74	4.00
Discipline	53	4.30	3.81
Program and time management	53	4.13	3.53
Courses in youth leadership in agriculture-FFA	53	4.08	3.77
Supervised Occupational Experience (SOE)	53	4.00	3.66
Programs for special needs students	53	3.96	3.68
Educational technology (courses in the use of audio-visual aids, equipment; preparation of instructional materials, etc.)	53	3.96	3.60
Program planning, development and evaluation	53	3.93	3.60
Execution of instruction (e.g. teaching techniques, methods, skills, etc.)	53	3.93	3.74
School-community relations	53	3.89	3.72
Planning of instruction	53	3.87	3.70
Cooperative Agricultural Education (CAE)	53	3.83	3.40
Guidance and counseling	53	3.81	3.62
Professional role and development	52	3.77	3.46
Young and adult farmer education programs	52	3.52	3.27

[a] Scale ranged from 6 = Requires large increase to 1 = Requires large decrease

[b] Scale ranged from 6 = Great improvement needed to 1 = No improvement needed

CONCLUSIONS AND RECOMMENDATIONS

Conclusions and recommendations derived from the findings of this study included the following:

CONCLUSIONS

1. Vocational agriculture teachers perceived that all 55 of the professional and technical competencies identified in this study are needed by beginning teachers. This is evidenced by the fact that all of the competencies were rated above 4.00 (moderate need) on the rating scale.

2. The undergraduate teacher education curricula have areas of needed improvement. This is evidenced by the fact that the highest mean rating for competencies attained was described as only "Moderate Attainment."

3. The discrepancies between competencies needed and attained were substantively large ($d > 1.00$) for more than 50 percent (n=28) of the 55 competencies.

RECOMMENDATIONS

1. The faculty of each undergraduate teacher preparation program should review and evaluate its program goals and objectives to reflect the changing needs of the beginning vocational agriculture teacher in terms of general, professional, and technical education.

2. State Departments of Education cooperating with faculties of undergraduate teacher preparation programs should design, develop, and implement annual statewide inservice programs for all new vocational agriculture teachers within the first year of their employment if such programs do not already exist. The program should be based on data from a reliable feedback mechanism devised to determine apparent deficiencies of the beginning teacher prior to the first semester of teaching.

3. Faculty of undergraduate teacher preparation programs should conduct program evaluations to determine program strengths and weaknesses so as to help make the necessary adjustments to meet the competency needs of their graduates.

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ASSESSMENT OF PRESERVICE PREPARATION BY RECENT GRADUATES OF AGRICULTURAL EDUCATION PROGRAMS
A Critique

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The authors have studied and reported on an interesting and important issue in the profession. Over the years, much criticism has been leveled at teacher educators and their programs for not adequately preparing students to enter the vocational agriculture teaching profession. This study addresses this criticism. The authors are to be commended on their choice of research topic.

The specific strengths of this paper were: (1) A strong rationale for the study was established. (2) The purpose and objectives were clearly stated and conclusions drawn to reflect on the objectives. (3) The tables presented results in a manner upon which accurate generalizations could be made.

Some weaknesses of the study were: (1) A uniform scale was used by the study participants to respond to the competencies yet the competencies varied in scope and breadth. How does one interpret the strength and scope of a mean of 4.67 for "introduce a lesson" and a mean of 4.63 for "maintaining the ethical and professional standards expected of the vocational agriculture teacher?" (2) Was any contact attempted of those seven nonrespondents to determine why they did not respond? (3) How were the competencies included in the study determined? Is it reasonable to expect that teacher education programs prepare students for teaching at the level teachers, reacting with experience even though they had taught for only five years or less, may feel the need to be? (4) The recommendations seem to suggest that ALL teacher education programs in agriculture should evaluate their programs to reflect beginning teacher general, professional, and technical education needs. This study focuses on beginning teacher needs in Louisiana. What data is presented that would allow the researchers to generalize the results of this study to ALL teacher education programs? (5) The recommendation was made that teacher education programs evaluate and make changes in their teacher education programs. Based on the findings of this study, what specific changes would you recommend for Louisiana teacher preparation programs in agriculture?

ATTITUDES OF NEBRASKA SUPERINTENDENTS, PRINCIPALS, AND VOCATIONAL AGRICULTURE INSTRUCTORS REGARDING THE DELIVERY OF ADULT EDUCATION THROUGH SECONDARY PROGRAMS

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INTRODUCTION

Vocational Agriculture programs across the nation have been losing enrollment and facing possible program reduction and/or elimination for several years. In Nebraska alone, there has been a decrease of about 21 percent, or 68,000 students in the K-12 public school system since 1972. According to the Nebraska Department of Education (1986), vocational agriculture programs across the state have lost 21 percent in secondary enrollment just since 1981.

Some secondary school administrators are beginning to see the adult population as another clientele group that can be served, while others continue to view their school systems as only for students in grades 9 through 12. Now may be the most important time for administrators and secondary vocational agriculture instructors to investigate the possibilities of adult education within public secondary vocational agriculture programs as a means of safeguarding vocational agriculture enrollment and fully utilizing school facilities in a time of reduced financial resources.

Rapid changes in agricultural technology, coupled with an increasingly older agricultural population, make adult education in agriculture a must (Drueckhammer, 1984). In order to facilitate the process of incorporating adult vocational agriculture education into traditional secondary programs, the individuals most directly involved in organizing, funding, and conducting adult programs need to be encouraged to do so.

Viterna (1973) concluded that administrators were directly responsible for program development. He also found that these same administrators were willing to support young farmer classes in Nebraska. Miller (1985) indicated that superintendents of comprehensive high schools in Ohio were conceptually supportive of adult vocational agriculture education, in his study of the attitudes of superintendents toward offering adult education in agriculture in secondary vocational agriculture programs. Miller recommended that similar studies be conducted in other states.

PURPOSE AND OBJECTIVES

The purpose of this study was to determine the attitudes held by Nebraska superintendents, principals and vocational agriculture instructors about the delivery of adult agricultural education programs within the public secondary school system.

The specific objectives identified for investigation were:

1. Determine if differences in attitudes exist between superintendents, principals, and vocational agriculture instructors toward adult agricultural education.

2. Determine if differences in attitudes exist between administrators (superintendents and principals) and vocational agriculture instructors toward adult agricultural education.

3. Determine the preferred agency/organization (extension, community colleges ect.)for delivery of adult education as perceived by superintendents, principals and vocational agriculture instructors.

4. Determine if differences in attitudes exist between administrators and vocational agriculture instructors by the existence of an adult program.

PROCEDURES

This was a descriptive study of the survey type. The population of interest consisted of all vocational agriculture instructors in Nebraska and the superintendents and principals who administered their programs. A list of current Nebraska secondary schools with vocational agriculture programs (n = 130) was obtained from the University of Nebraska Department of Agricultural Education. From this list a random sample (44%) of the schools were selected for inclusion in the study. The superintendents, principals and vocational agriculture instructors for each of the 57 schools (total n = 171) were included in the sample.

A questionnaire was developed from a review of literature. A jury of teacher educators from the UNL Department of Agricultural Education established content validity for the instrument. A Cronbach's Alpha Reliability Coefficient of .7812 was observed for the entire instrument.

Each questionnaire contained 30 specific attitudinal items as well as selected demographic data. Respondents were asked to respond to each item using a four point, bipolar scale with the selections 1 = Strongly Disagree, 2 = Disagree, 3 = Agree, and 4 = Strongly Agree.

Analysis of each item as well as categorical data was accomplished using inferential statistical procedures. In order to control for the effects of an inflated alpha, the survey items were further grouped into four variables of Need for the adult program, Benefit of the adult program, Operation of the adult program, and Funding of the adult program. This grouping facilitated a better understanding of attitudes of a categorical nature and assisted in the analysis of the data.

The surveys were mailed to each individual separately. A follow-up phone call was made to individuals who had not responded after two follow-up mailings to encourage their participation and determine any nonrespondent error. A t-test was used to determine if differences existed between the nonrespondent groups and those completing the survey initially. No differences were observed. A total response rate of 92.4% or 158 individuals out of 171 were included in the study.

Data analysis procedures consisted of calculating means and standard deviations, and determining statistical differences through the use of t-tests and oneway analysis of variance using planned comparisons. Multivariate analysis of variances was used to determine possible interaction effects.

RESULTS

Upon analysis of the data the following results were obtained:

Objective 1: Determine if differences in attitudes exist between superintendents, principals, and vocational agriculture instructors toward adult agricultural education.

Data in Table 1 reflect the agreement of superintendents, principals and vocational agriculture instructors with attitudinal statements about adult education in agriculture. The table is organized into the four categories of need, benefits, operation and funding.

While several specific statement differences were observed between teachers and principals and teachers and superintendents, no differences in agreement on statements were observed between administrative groups.

Vocational agriculture instructors had significantly higher agreement ratings than from both administrative groups on the following statements:

--Those who participate in adult programs are strong school supporters.
--A high school's primary responsibilities are to students in grades 9-12.
--The free public education system extends to adult students.

Table 1.
Attitudes of Principals, Superintendents and Vocational Agriculture Instructors Toward Adult Education

Item		Respondent Group			
		Principal	Superin't	Vo Ag	Total
NEED (Composite)	M	3.1	3.1	3.1	3.1
	SD	.35	.42	.36	.37
● Ag is of little importance in our school district	M	3.6	3.4	3.7	3.6
	SD	.64	.95	.73	.80
● Adult Ed programs should be available to everyone in the district.	M	3.2	3.2	3.9	3.3
	SD	.58	.65	.67	.63
● Adult programs need to be geared toward retraining for new employment.	M	2.5	2.5	2.4	2.5
	SD	.61	.78	.66	.69
● Adult programs should include new technological skills needed for employment	M	3.1	3.1	3.1	3.1
	SD	.53	.45	.46	.48
BENEFITS (Composite)	M	3.1	3.0	3.2	3.1
	SD	.29	.40	.35	.35
● Adults in our district want more information about agriculture	M	3.1	3.1	3.1	3.1
	SD	.58	.44	.56	.53
● Adult programs should serve the non-ag public	M	2.7	2.8	2.7	2.7
	SD	.58	.78	.70	.68
● Adult programs improves community attitudes about the school	M	3.5	3.3	3.4	3.4
	SD	.54	.58	.64	.59
● Adult programs have a visible impact on local agricultural practices	M	2.8	2.7	3.1	2.9**b
	SD	.60	.61	.58	.61
● Participates in adult programs are strong school supporters	M	2.9	2.8	3.2	3.0**c
	SD	.50	.69	.58	.61
● Adult programs provide good public relations	M	3.4	3.2	3.4	3.3
	SD	.49	.47	.53	.50
● Adult programs in ag detracts from secondary vo ag program	M	1.7	1.8	1.8	1.8
	SD	.71	.56	.72	.68
OPERATION (Composite)	M	3.1	3.1	3.2	3.1
	SD	.19	.24	.21	.22
● A high school's primary responsibility is to students in grades 9-12	M	1.7	1.5	2.1	1.7**c
	SD	.67	.67	.84	.77
● Adult programs are the responsibility of the Post secondary vo-tech schools	M	2.5	2.6	2.0	2.4**c
	SD	.67	.72	.52	.68
● Adult programs in agriculture should serve the non-agricultural public	M	2.7	2.8	2.7	2.7
	SD	.58	.78	.70	.68
● Adult programs should be offered by all high schools that offer vocational agriculture	M	2.6	2.5	2.8	2.7
	SD	.68	.76	.70	.72

Table 1 (continued)

• Comprehensive high schools should offer adult programs when the need is present	M	3.0	2.9	3.2	3.0
	SD	.76	.77	.64	.73
• Adult ed is the responsibility of the Cooperative Extension Service	M	2.5	2.7	2.6	2.6
	SD	.69	.65	.70	.68
• Adult programs are the responsibility of the community colleges	M	2.8	2.7	2.5	2.7*a
	SD	.64	.63	.58	.63
• Adult programs should be with the assistance of a vo ag advisory committee.	M	3.0	3.0	3.2	3.1*a
	SD	.56	.49	.62	.57
• Use of school facilities during hours when school is in session is acceptable	M	2.2	2.4	2.7	2.4**a
	SD	.83	.84	.75	.83
• The UNL Ag Ed Department supports programs as part part of secondary programs	M	3.0	3.0	3.1	3.0
	SD	.63	.34	.52	.51
• Use of school facilities during non-regular school hours is acceptable	M	3.3	3.4	3.5	3.4*a
	SD	.45	.50	.50	.49
• Current vo ag instructors do not want to teach adult programs	M	3.0	3.1	2.9	3.0
	SD	.49	.66	.75	.64
• Adult programs should be conducted by someone other than the vo ag instructor	M	2.7	2.8	2.9	2.8
	SD	.67	.73	.74	.71
• Vo ag instructors do not have the time to teach adult programs	M	2.4	2.2	2.5	2.3
	SD	.65	.72	.80	.73
• Adult programs should be intensive and in-depth in order to be useful	M	2.4	2.6	2.6	2.5
	SD	.70	.85	.70	.75
FUNDING (Composite)	M	2.6	2.6	2.6	2.6
	SD	.23	.19	.21	.21
• Nebraska State Dept of Ed supports adult ed as part of secondary vo ag programs	M	2.7	2.9	3.1	2.9**a
	SD	.54	.45	.50	.51
• All consumable supplies used in adult programs should be paid by participants	M	3.2	3.3	2.6	3.1**c
	SD	.59	.62	.69	.70
• State and federal funding is adequate for adult ed	M	2.0	1.8	1.9	1.9
	SD	.72	.81	.90	.82
• The free public education system extends to adult education as well	M	2.2	1.9	2.7	2.2**c
	SD	.85	.74	.76	.84
• Adult programs need to be self-supporting	M	3.0	3.1	2.3	2.8**c
	SD	.75	.73	.63	.79
• Local tax dollars should be used for adult education	M	1.8	1.7	2.7	2.2**c
	SD	.72	.75	.65	.65
• Funding of programs is not an issue in adult education	M	1.7	1.6	1.9	1.7
	SD	.85	.80	.81	.82

Note: * = $p < .05$ ** = $p < .01$
a = Vo Ag Teachers differ from Principals
b = Vo Ag Teachers differ from Superintendents
c = Teachers differ from both Principals and Superintendents

--Local tax dollars should be used to support adult education.

Vocational agriculture instructors have significantly lower agreement ratings than from both administrative groups on the following statements:

--Adult programs are the responsibility of the post-secondary schools, not the high school.

--All consumable supplies used by adults should be paid for by adult students.

--Adult programs need to be self-supporting.

Vocational agriculture instructors have significantly higher agreement ratings than principals on the following statements:

--Adult programs should be conducted with the aid of an advisory council.

--Use of school facilities during hours school is in session is acceptable.

--Use of school facilities during non-regular school hours is acceptable.

--Nebraska State Department of Education supports adult education as part of secondary vocational agriculture programs.

Vocational agriculture instructors had a significantly lower agreement rating than principals on the following statement:

--Adult programs are the responsibility of the community colleges.

Vocational agriculture instructors have significantly higher agreement rating than superintendents on the following statement:

--Adult education has a visible impact on local agricultural practices.

Objective 2: Determine if differences in attitudes exist between Administrators (superintendents and principals combined) and vocational agricultural instructors toward adult agricultural education.

Attitudinal scores of principals and superintendents were combined to reflect one administrative rating and compared with attitudinal ratings of the instructor group using planned comparisons and analysis of variance procedure. A statistical difference in the area of Operation ($p < .026$) was observed. However when the actual means were reviewed, the difference was not meaningful. All other areas of comparison between administrators and vocational agricultural instructors were not significant.

Objective 3. Determine the preferred agency/organization for delivery of adult education as perceived by superintendents, principals and vocational agricultural instructors.

Figure 1 illustrates the percentage of respondents selecting specific agencies and/or organizations as being most responsible for delivery of adult education at the local level. It was observed that 34 percent of those surveyed indicated secondary school systems as being their first choice for delivery of adult agricultural education. The agency selected as second most responsible for delivery of adult agricultural education was the cooperative extension service (22%).

Objective four addresses interactions that may exist between two demographic variables; respondent group and the attitudinal areas of need, benefits, operation, and funding. In order to control for inflation of the family wide alpha error rate the two variables believed to have the potential for the most interaction were selected.

Objective 4: Determine if differences in attitudes exist between administrators and vo ag instructors by the existence of an adult program.

The MANOVA procedure was used for this analysis. The four attitudinal areas where analyzed by the position of the respondent and the presence or absence of an adult program. A significant interaction was observed between the current existence of an adult program and respondent group by Operation of the adult program (Table 2). Those vocational instructors who have adult programs viewed the Operation of the adult programs differently than those instructors who did not have an adult program. They also viewed the operation differently than both superintendents and principals who may or may not have adult programs.

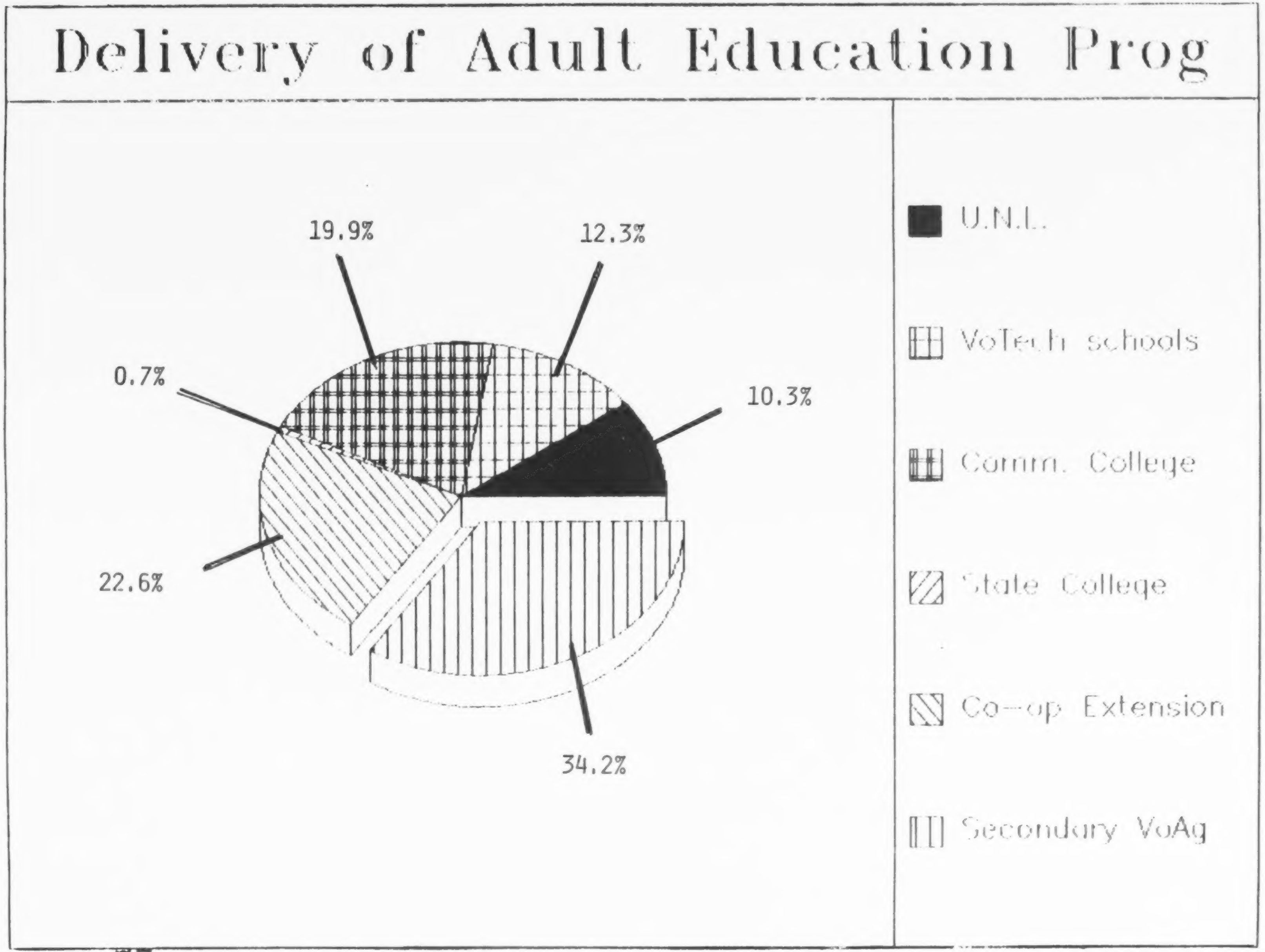
Delivery of Adult Education Prog
19.9%
12.3%
0.7%
10.3%
22.6%
34.2%
■ U.N.L.
▦ VoTech schools
▦ Comm. College
▨ State College
▧ Co-op Extension
▥ Secondary VoAg

Figure 1

The attitude of respondents by position toward the benefit of an adult program and the fact they may have an existing adult program show no significant interaction. There was however, a significant main effect ($p < .001$) indicating those schools with existing adult programs had a higher mean (3.19) than those schools that did not have an adult program (2.99).

Table 2.
Differences Among Respondent Group With Adult Programs by Operation.

Source of Variation	S.S.	D.F.	M.S.	F ratio	Prob.
Position	.259	2	.129	3.20	.045*
Adult Prg X Position(1)	.067	1	.067	1.66	.199
Adult Prg X Position(2)	.117	1	.117	2.90	.091
Adult Prg X Position(3)	.350	1	.350	8.62	.004**
Adult Prg	.463	1	.463	11.43	.001***
Position X Adult Prg(1)	.334	2	.167	4.12	.019*
Position X Adult Prg(2)	.036	2	.018	.444	.643
Within cells	4.21	104	.040		

Note: Position 1 = Principal , Position 2 = Superintendent
Position 3 = Vo Ag Instructor
Adult Prg 1 = Existing Secondary Adult Agriculture Programs
Adult Prg 2 = No Secondary Adult Agriculture Programs
* $p < .05$, ** $p < .005$, *** $p < .001$

CONCLUSIONS AND RECOMMENDATIONS

The findings of this study support many of the findings of Miller (1985). Miller indicated that superintendents generally had a positive attitude toward adult education in secondary school systems in Ohio.

The following conclusions were developed upon completing the review of the statistical information.

1. In rating their own attitude toward adult education in the secondary school 85.4 percent of all respondents indicated a somewhat positive to positive attitude toward offering adult programs in their system.

2. It was observed that 44.9% of vocational agriculture instructors, 32.6% of the superintendents and 25.5% of the principals believed the secondary vocational programs are most responsible for delivery of adult agricultural programs at the local level. Overall 34.5 percent of the respondents believed that secondary programs should deliver adult agricultural at the local level.

3. It was concluded that principals and superintendents have very similar perceptions of the need, benefits, operation, and funding of adult education in agriculture, providing uniform administrative agreement.

4. It was observed that vocational agriculture instructors were more likely to be in higher agreement with statements about the benefits and public support for adult education, while administrators are more likely to safeguard traditional school funding and structure.

5. When funding issues were considered, teachers were more likely to agree that adult education should be funded similarly to the secondary system, while administrators viewed adult education as being more self-supportive in nature.

6. Those instructors with current adult programs view the operation significantly different than administrators who have current programs and different than administrators and instructors who do not have adult programs. Further, administrators having adult programs in their school systems view adult education significantly more positively than any respondent group not having adult education in their school system.

RECOMMENDATIONS

Based on the conclusions of this study, the following recommendations are made:

1. Nebraska Department of Education personnel working in adult education be made aware of the positive attitude of administrators and instructors toward adult education in agriculture in secondary programs.
2. Use should be made of administrators and instructors currently having adult programs in agriculture to convince others of the value of adult education through secondary programs.
3. Encourage state supervisors and teacher educators to work cooperatively with secondary administrators in identifying ongoing sources of funding and support for adult education. These may include the use of locally generated tax dollars or through self-supported program offerings.
4. Encourage local instructors and administrators to discuss differences in opinion and support of adult education to ensure greater chances of success.
5. Develop contractual position description for instructors to teach both traditional day-class students and adult classes in agriculture. Pilot test cooperative adult/day-class programs in schools in different areas of the state and in districts with both large and small secondary enrollment.
6. Conduct additional research investigating the adult student attitude toward the delivery of educational programs through the secondary vocational agriculture program.

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ATTITUDES OF NEBRASKA SUPERINTENDENTS, PRINCIPALS AND VOCATIONAL AGRICULTURE INSTRUCTORS REGARDING THE DELIVERY OF ADULT EDUCATION THROUGH SECONDARY PROGRAMS

A Critique

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The study addresses a significant program of low enrollment in agriculture that could be alleviated through serving more adults. Determining the attitude of administrators and teachers toward adult education and who should serve the needs of adults is a first step. The review of literature, although limited, documented the need and provided a rational for the study. Proper consideration of validity, reliability, and treatment of non-respondents was given. The sample size was adequate. Citing a reference supporting the adequacy of the sample size would strengthen the paper.

The authors are to be commended for recognizing the problems associated with performing a series of F-tests on several related attitudinal statements. Thirty-three statements were placed into four categories and a composite F-test was determined. The means and standard deviations for the composite attitudinal scores were almost identical. Having recognized the problem, the authors proceeded to ignore it and next reported the F-values of individual items, ten of which were significant at the .01 level. Some values at the .05 level were also reported. Especially when dealing with a problem of an inflated alpha, a single, difficult-to-attain alpha level should have been chosen.

The way the findings were written was difficult to follow. It is suggested that the findings be written in such a way that agreement-disagreement and positive-negative statements be more easily distinguished. From the table it was very clear what the findings were. It should be equally clear from the description.

ATTITUDES OF SELECTED POLICY MAKERS TOWARD AGRICULTURE

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Historically the word "agriculture" has been used synonymously with the word "farming." The words "agriculture and farming" were often associated with mental images of a family farm; self-sufficient, self-reliant, a man and his family valiantly struggling against insurmountable odds. However, the once self-sufficient family farm now depends on agribusiness for their fertilizer, herbicide, seed, equipment, and finance. In 1981 (Hefferman, Green, Lasley, and Nolan, 1981) found that non-farm income helped support 92 percent of the farm families in America.

Some agricultural educators feel that the American public is unaware of the change occurring in American agriculture. As stated by Coon and Cantrell (Coon and Cantrell, p. 22):

> Today, the American public's image of agriculture is a kaleidoscope of leftover attitudes and images of what agriculture was during the 40's, 50's, and early 60's. Agriculture is viewed as farming with no understanding of the impact of agriculture on other sectors of the economy.

One way of improving the image and understanding of agriculture should be through the public and private educational system. However, if those who determine educational policy have misconceptions about agriculture, the future of agriculture may rest in unstable hands. Attitudes and perceptions of what agriculture was like during the 40's, 50's, and 60's are not sound bases from which to make decisions which affect the future of agriculture and agricultural education.

PURPOSE OF STUDY

"The term attitude refers to a persons favorable or unfavorable evaluation of an object" (Fishbein and Ajzen, 1975, p. 12). It is defined as a manner of acting, feeling, or thinking that shows one's disposition, opinion; one's mental set, etc. (Woolf, 1981). According to Eiser (Eiser, 1984), it is important to know one's attitudes to enable change in that attitude. With this in mind, respondents were asked how important agriculturally related issues were to them. Therefore, the central purpose of this investigation was to assess the attitudes of selected Iowa educational and political policymakers toward American agriculture. Specific objectives were to:

1) Determine the attitudes of Iowa teachers, school administrators, state legislators, and school board presidents toward American agriculture.

2) Determine the demographic factors associated with the attitudes expressed by Iowa teachers, school administrators, state legislators, and school board presidents.

PROCEDURES

Based on the population numbers within each of the respondent groups, it was recommended that 458 teachers, 135 school administrators, 136 school board members, and 65 state legislators be surveyed.

Simple random sampling was employed for the teachers and state legislators. School administrators and school board presidents from school districts with less than 3000 students were simple random sampled. School administrators and school board presidents from school districts with a student population equal to or greater than 3000 students were stratified random sampled.

Responses were received from 288 teachers, 94 school administrators, 82 school board members, and 30 state legislators consisting of a 64 percent response rate.

The author's review of literature revealed that Americans tend to view agriculture as: 1) a part of the American economy, 2) a way of life, 3) an industry, 4) a science, 5) a business, 6) becoming more mechanized, and 7) becoming more technical (Myster, 1943) (Bell, 1970) (Skadburg, 1971). Based on these criteria, approximately fifty attitude statements toward agriculture and seventeen associated demographic variables were identified for the initial draft of the instrument.

Content validity was established by a panel of six persons. Members of the validation committee included a school board member, a farmer, a vocational agriculture instructor, two professors of agricultural education, a rural sociologist, and a former school administrator. Based on their recommendations, the number of attitude statements were reduced to twenty-three and the number of demographic variables increased to 25.

A reliability coefficient for the instrument was calculated using Cronbach's alpha. The overall instrument reliability was calculated to be .88.

According to Liu (Liu, 1971), the number of units necessary in a measurement scale is dependent upon how well the respondent understands the subject in question and whether or not the respondents have heterogeneous backgrounds (Wolins, 1986). Traits which are well defined and individuals with similar backgrounds supports the use of fewer units in the measurement scale. Since the respondents of this study were of different backgrounds and had varying levels of agricultural knowledge, a one to 99 scale was selected. According to Liu (Liu, 1971), a one to 99 scale would improve the validity of the measure. The scores were then transformed to normal deviates. Analysis was then conducted on the transformed values after they were adjusted to eliminate decimal fractions and negative values. Transformed scale values ranged from 267 to 733.

According to Wolins and Dickinson (Wolins and Dickinson, 1973), there is a natural tendency for individuals to respond in a set pattern to questions when using a larger scale. Transforming the data to normal deviates helps controll this natural tendency.

Data were collected through the use of a questionnaire. At the conclusion of data collection, telephone calls were randomly placed to five percent of the non-respondents to determine any non-response bias. t-test analysis between the mailed responses and the telephone responses indicated that non-response bias should not bias the findings.

ANALYSIS OF DATA

School administrators and school board presidents from smaller school districts had a disproportionate number of school administrators and school board presidents per teacher when compared to larger Iowa School districts. Simple random sampling from these groups would have yielded a heavy response from the smaller school districts. However, a larger number of teachers taught in larger Iowa school districts. As such, weighting the data facilitated comparisons between groups. Weight factors are reported in Table 1.

Statistical analysis was conducted using SPSS^{x} (Norusis, 1985) (Norusis, 1986). Means, standard deviations, analysis of variance, regression, t-tests analysis, and factor analysis were employed where appropriate. Scheffe's multiple range test was employed to isolate the source of significant differences.

Table 1. Weighting procedures for school board presidents and school administrators

	Number in the Population	Number Sampled	Number of Valid Responses	Weight Factor
School administrator (> 3000)	565*	32	19	29.7
School administrators (< = 3000)	1334	103	75	17.8
School board presidents (> 3000)	23	23	11	2.1
School board presidents (< = 3000)	413	113	71	5.8

* example calculation: 565/19 = 29.7

Factor analysis was conducted on the 23 attitude statements using the principle components method and varimax rotation (Table 2). An eigen value of one appeared to be a logical point to ascertain the number of factors underlying the scaled items for the agricultural attitudes. The six factors extracted using this procedure were named by the investigator as follows: 1) New agricultural technology, 2) Agricultural careers, 3) Agriculture as an industry, 4) Agricultural support-research/financial, 5) Agricultural mechanization, and 6) Agriculture as a big business.

Table 2. Results of the factor analysis for the attitude statements

Factor item	Loading
Factor one: (New agricultural technology)	
How important (is/is it):	
college education for farmers to remain technically competent?	.797
college education for agribusiness persons to remain technically competent	.794
that agribusiness persons learn to use new technology?	.732
that farmers learn to use new technology?	.712
that farmers monitor their work with computer technology?	.693
that genetic engineering helps develp better cereal grain varieties?	.597
Factor two: (Agriculture as a way of life)	
How important (is/is it):	
that young people pursue agricultural careers in Iowa?	.866
that young people pursue agricultural careers in the United States?	.859
that young people are raised on a farm?	.669
that I am associated with agricultural work?	.470
Factor three: (Agriculture as an industry)	
How important (is/is it):	
farming to the agricultural industry?	.788
agribusiness to the agricultural industry?	.740
that farmers manage their farm as a business?	.647
that the agricultural industry is controlled by world-wide economic conditions?	.412
Factor four: (Agricultural support-research/financial)	
How important (is/is it):	
that the federal government subsidize the American farmer?	.975
that embryo transfers help to develop better breeds of livestock?	.972
Factor five: (Agricultural mechanization)	
How important (is/is it):	
that farming becomes more mechanized?	.879
that agribusiness becomes more mechanized?	.876
that new chemicals are developed to control weeds/insects on farms?	.461
Factor six: (Attitudes toward agriculture as big business)	
How important (is/is it):	
that farming has become big business?	.910
that agribusiness has become big business?	.899

Cronbach's alpha reliability coefficients were calculated for the six attitude factors. All factor reliability coefficients were .72 or above. The overall reliability coefficient was .75. Based on the strength of the reliability coefficients, the factors extracted were considered adequate to measure the respondents' attitudes toward agriculture.

The oneway analysis of variance data presented in Table 3 revealed significant differences among the respondent group means concerning their attitudes toward agriculture. The factors "agricultural careers," "financial/research related support for agriculture," and "big business aspects of agriculture" were significantly different at the .01 level. The state legislator group was significantly different from the teacher, school administrator, and school board president group means for the factor "financial/research support for agriculture." The school board president mean was significantly different from the teacher and state legislator mean for the factor "careers in agriculture."

The state legislator group felt that mechanization of agriculture was less important than did the other respondent groups. However, state legislators felt financial/research was more important to Iowa agriculture than did the other respondent groups.

School board presidents felt it was more important for youth to pursue careers in agriculture than did the other respondent groups. All respondent groups felt agriculture was an important industry and that agriculture will continue to incorporate new technology.

However, respondent groups felt research/financial support for agriculture was least important of the six attitude factors. Respondent groups as a whole felt it was less important for youth to pursue careers in agriculture and that agriculture become more mechanized with each passing year.

Stepwise regression analysis of demographic variables revealed that 21 of the demographic variables accounted for 21 percent of the variance among the composite attitude factor means (Table 4). Each of these variables contributed statistically to the variance. The population of the town where the respondent was raised, the age of the respondent, years of advisory committee experience, membership in agricultural professional organizations, and whether or not the respondent had a financial investment in an agribusiness accounted for the largest part of the variance.

Table 3. Attitudes, means, standard deviations, F-values and F-probabilities by attitude factor

		Groups						
Attitude factor		School board presidents (n=434) (1)	Teacher (n=288) (2)	School administrator (n=1899) (3)	State Legislator (n=30) (4)	Total (n=2651)	F-value	F-prob.
Agricultural technology	M[a]	555.17	555.66	553.30	546.93	553.79	.3893	.7607
	SD[a]	47.37	54.25	58.38	57.62	56.25		
	P[a]	2	2	2	3	2		
Agricultural careers		546.62	530.81	512.38	508.81	519.95	42.4994**	.0001
		63.99	63.04	58.06	73.30	61.19	(1<>3,1<>4)	
		3	3	5	5	5		
Agriculture as an industry		634.19	624.26	626.34	626.30	627.40	2.4565	.0613
		60.07	57.46	57.97	60.89	58.34		
		1	1	1	1	1		
Financial/ research support for agriculture		522.41	527.13	510.27	573.37	514.80	6.8044**	.0001
		96.34	95.65	103.74	96.42	101.96	(4<>1,2,3)	
		5	5	6	2	6		
Agricultural mechanization		523.08	531.00	522.74	498.27	523.41	2.1217	.0955
		70.08	64.90	78.32	79.96	75.73		
		4	4	4	6	4		
Agriculture as a big business		512.21	525.53	545.62	533.08	537.82	19.6488**	.0001
		79.77	75.26	90.22	70.63	87.78		
		6	6	3	4	3		

[a] M = Group means
[b] SD = Standard deviation
[c] P = Position among means

Table 4. Stepwise regression analysis of demographic variables (x) on the composite mean scores for the attitude factors (y) of the respondent toward agriculture (F-value to enter = 3.84, F-value to remove = 2.71)

STEP	ACTIVITY	VARIABLE	MULTIPLE-R	F-value
Attitudes toward agriculture				
1	Enter	Population of town where raised	.18366	92.51
2	Enter	Age of respondent	.24713	86.15
3	Enter	Years ag advisory committee exper.	.27636	72.99
4	Enter	Agricultural professional membership	.29974	65.32
5	Enter	Money invested in an agribusiness	.32084	60.73
6	Enter	Years administration experience	.34036	57.76
7	Enter	Years of formal education	.35419	54.18
8	Enter	Years school board experience	.36408	50.48
9	Enter	Respondents self rating of ag knowl.	.37310	47.47
10	Enter	Money invested in a farm	.38221	45.18
11	Enter	Years teaching experience	.39654	44.78
12	Enter	Mothers occupation during H. School	.40756	43.80
13	Enter	Where respondent lives	.41545	42.33
14	Enter	Years in FFA	.42361	41.19
15	Enter	Participation in ag inservice	.42976	39.81
16	Enter	Respondents job title	.43546	38.54
17	Enter	Population of town where living	.44011	37.22
18	Enter	Years High School vo ag.	.44539	36.20
19	Enter	Agricultural employment history	.44813	34.81
20	Enter	Years agricultural adult education	.45095	33.58
21	Enter	Years membership ag professional org	.45257	32.26

CONCLUSIONS/RECOMMENDATIONS

1. Agricultural education leadership should try to involve the teachers, state legislators, school board presidents, and school administrators in agricultural activities. Respondents who were involved in agriculture tended to place more importance on agriculture.

2. State legislators must be made more aware of agricultural issues and emerging technologies. State legislators generally placed less importance on the agricultural factors when compared to the other respondent groups.

3. School administrators and teachers with several years of teaching experience must be made more aware of agricultural issues and emerging technologies. Younger school administrators and teachers with 21 or more years of teaching experience placed less importance on agriculture than did other school administrator respondent groups and younger teacher respondent groups.

4. Further research is needed to ascertain how ones attitude toward agriculture affects ones perception of agriculture.

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ATTITUDES OF SELECTED POLICY MAKERS TOWARD AGRICULTURE
A Critique

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This study was important and timely. The authors have attempted to determine how key individuals, whose opinions will have major influence on the future of agriculture, feel about agriculture. The identification of school board presidents, agricultural teachers, school administrators and state legislators as the population for the study provide an informative comparison of how various sectors view agriculture.

This research reports that there is little significant difference between the attitudes of agricultural teachers, school board presidents, school administrators and state legislators. In the few areas where significant differences do exist, interestingly enough, it was the state legislators who felt financial/research was more important to Iowa agriculture than did the other respondent groups were on most areas. If these findings were indeed an accurate reflection of the attitudes of the groups surveyed, agricultural education in Iowa should have a base on which to develop and improve programs.

The purpose of the study was clearly delineated. An appropriate rationale for undertaking the study was given and supported from a review of research and recent events. The researcher used appropriate and effective means to establish the validity and reliability of the instrument. The follow up of non respondents is also to be commended. The use of the stepwise regression analysis of demographic variables was an effective way to determine the relationship of demographic attributes to the variables being investigated.

The major questions that come to mind when reviewing this research are questions that problably could be answered if one could see the text of the entire study. However, there are a few areas that were not clear to me as I read the study. Random sampling was used as the technique to determine the sample for study. With the exception of school board presidents and school administrators there was no indication of the size of sample used in the study. A return rate of 64 percent was reported as an aggregate of all four groups sampled. The study could be more easily analyzed if the size of sample and response rate for each group were known by the reader. The paper could have been strengthened by including the sample numbers under the "n" heading rather than population numbers. One key problem that could improve the paper is to resolve the question regarding the reliability of the instrument. There are two different reliability coefficients reported for the insturment. Either one should be eliminated or the reason for the two coefficients should be explained in the paper.

CHARACTERISTICS AND ACTIVITIES OF VOCATIONAL AGRICULTURE TEACHERS AND FFA CHAPTERS RELATED TO PARTICIPATION IN COMMUNITY DEVELOPMENT

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INTRODUCTION

Vocational agricultural education has had a long standing tradition of community involvement. According to the Federal Board of Vocational Education's Sixth Annual Report (1922), "school boards are taking more interest in the [student's] work and are requiring the men a larger amount of community service work." (p.226) Christenson (1982) stated that community development stimulates local initiative, builds channels of communication that promote solidarity, and improves the social, economic, and cultural well-being of community residents. As there has been a shift in the 1980s from "on-farm" to "off-farm" agricultural occupations, Lee (1981) indicated that school-community relations were not only social but also economic especially as new relationships with agribusiness industries were essential.

The National Future Farmers of America Organization established the Building Our American Communities (BOAC) program in 1970 as a formalized community development activity for vocational agriculture (National FFA, 1970). Emmerick (1975) charged teachers with the responsibility of involving students in community activities in order to find real life work, leadership, and social experiences.

Ninety percent of Virginia vocational agriculture teachers whose FFA chapters participated in the BOAC program included community development as part of the instructional program compared to only 50% of the non-participating teachers (Clouse and Wheeler, 1986). Clouse and Wheeler also found BOAC participating teachers to be more highly involved in community and professional organizations than were non-participating teachers. The BOAC participating FFA chapters had a higher percentage of vocational agriculture students as FFA members and the chapters were involved in more activities than non-participating BOAC FFA chapters (Clouse and Wheeler, 1986).

NEED FOR THE STUDY

The BOAC program was designed as a program to encourage participation in community development. Yet over the history of the program, only 18% to 20% of all FFA chapters formally participated in the program, (Voth, 1987). Interestingly enough, over $300,000 is contributed by the national sponsor to support the program. This study was part of a three year study needed to determine the extent of community development activities nationally and sought to compare those vocational agriculture teachers and FFA chapters which have and have not participated in the BOAC program.

PURPOSE AND OBJECTIVES

The purpose of the national study was to describe the characteristics of vocational agriculture teachers, their FFA Chapters, schools, communities, and community development activities and to determine if relationships existed between those characteristics and participation in the Building Our American Communities (BOAC) program. The following research questions were investigated by the study:

1. To what extent have FFA chapters participated in the BOAC program as the formalized FFA community development program ?
2. What characteristics of vocational agriculture teachers, FFA chapters, schools, and communities relate to participation in the BOAC program ?
3. Are there characteristics of vocational agriculture teachers, FFA chapters, schools, and communities which distinguish between participants and non-participants in the BOAC program ?
4. What type of resource inputs and outcomes result from participation in the BOAC program ?

PROCEDURES

Survey research techniques were used to describe and compare characteristics of BOAC program participants past participants, and non-participants. The study employed a descriptive research design, "systematically describing the facts and characteristics of a given population or area of interest, factually and accurately." (Isaac and Michael, 1983) In a broad context, survey research also permits the researcher to make comparisons and evaluations.

INSTRUMENTATION

The survey instrument was designed by Malpiedi (1984) for use in her dissertation research. Items for the instrument were selected from educational, sociological, and community development literature. The Virginia Tech Agricultural Education faculty and the National BOAC Advisory Committee reviewed the instrument for content validity. Virginia vocational agriculture teachers field tested the instrument. Pilot studies were conducted using the instrumentation to survey participants at the 1983 and 1984 National Conferences on Community Development. Revisions deemed necessary by the National BOAC Research Committee were made for clarity and readability.

The first part of the survey elicited information regarding vocational teachers' demographic characteristics; social and economic status; leadership characteristics; teaching experience; community development curriculum; and BOAC project involvement. The second part of the survey obtained information about the respondents' local communities, FFA chapters, and schools. The third part of the instrument was designed to collect BOAC project information from BOAC program participants. All respondents were asked to evaluate the resource materials available through the National FFA for teaching community development and for conducting BOAC programs.

THE POPULATION AND SAMPLE

The population for the study included all 8300 chartered FFA chapters in good standing in 1984 identified from National FFA records. Using computerized files at the National FFA, all chapters from 51 state associations were sorted into those who had participated in BOAC during the 1983-1984 reporting year and those who had not participated. A random sample of 360 FFA chapters was selected (Krejcie & Morgan, 1970). The proportional random sample included two major subgroups:140 chapters which had participated and 220 which had not participated in 1984. A participant was defined as an FFA chapter which completed the 1983-1984 BOAC application and submitted the application for recognition above the chapter level.

DATA COLLECTION

National FFA data banks were used as one source of information for assessing the levels of participation for chapters since the establishment of the BOAC program. Final reports from the FFA contest and program division were also used.

The first survey mailing was conducted during October, 1984. Due to the length of the survey and detail level, participants were given approximately four weeks to respond. A follow-up mailing was completed in November and a post card reminder was sent in January, 1985. At that time, subjects were thanked if they had responded or asked if they would respond to the study if another survey was mailed to them. The final mailing to those who responded positively was completed in February.

A total of 207 or 58% of the subjects returned completed surveys. Of the 207, there were 92 (66%) BOAC 1984 participants and 115 (52%) non-participants. Non-participants included sixty-eight teachers who had never participted in BOAC and 47 who had participated at the some time prior to 1984. Since late respondents are considered similar to non-respondents (Miller & Smith, 1983), a comparison of early to late respondents by subgroups was conducted on selected variables. No significant differences were found between early and late respondents.

ANALYSIS OF THE DATA

All data were coded. Data for statistical analysis were entered into the North Carolina Triangle University Computing consortium main frame system in 1985. The SPSS-X program was used for statistical analysis. Qualitative techniques were used to interpret open-ended item responses Established trends were determined and reported. Comparison groups included participants, sometime participants and non-participants. For the purpose of data analysis, only those who participated in 1983-1984 were considered participants. Sometime and non-participant responses did not differ significantly. Therefor for selected procedures, sometimes and non-participant responses were collapsed.

Teacher demographic, community, school, and project descriptive data were reported as frequencies, percentages, or measures of central tendency where appropriate. T-tests for independent groups were used to determine differences between participants and non-participants for interval level variables - FFA membership, vo-ag enrollment, years of participation in FFA sponsored programs, age, years teaching, hours teaching community development, hours supervising community development.

To determine if relationships existed between selected variables and participation, Chi-square tests of independence were conducted. The strength of the relationship was reported as Cramer's V statistic. Pearsons product moment correlations were used with interval data. Davis Conventions were used to interpret the strength of the relationships. Tests to assure that the data met the assumptions related to the statistical technique were made. The level of significance, alpha .10, was selected a priori.

Twelve individual scales were created by transforming related subvariables to a major variable. Variables for which scale scores were created included: teacher organizational membership, school environment, community transportation, community complexity, youth organizations, agricultural organizations, other community organizations, commitment to teaching community development, FFA chapter activity, FFA chapter recognition level, FFA chapter program participation, and teacher leadership. Multiple regression analysis or analysis of variance were used as appropriate.

LIMITATIONS OF THE STUDY

The following limitations of the study were identified:

1. Interpretation of the results may be inferred only to vocational agriculture teachers and programs that also have chartered FFA chapters.
2. It seems likely that the length of the questionnaire affected the return rate, which was

somewhat lower than is normally achieved with the procedures that were used.

FINDINGS

LEVELS OF PARTICIPATION

From the examination of National FFA data banks, participation in the BOAC program ranged from 4.5% in 1971 to 19.6% in 1986. The Central FFA Region has maintained the highest average percentage of chapter participation, 34.3%, compared to 18.8% from the Eastern Region, 18.6% from the Western Region, and 11.0 % from the Southern Region. National participation rates may be impacted by several states that have large numbers of FFA chapters and low rates of BOAC participation. For example, Texas has 949 FFA chapters and 4% participation in the BOAC program. California, with 321 FFA chapters, has approximately a 2% BOAC participation rate. FFA Regional and national workshops were conducted with the intent to increase participation in the BOAC program. These may have influenced the increase by as much as 10% in 1982 or at least maintained 18% to 19.6% participation rates during 1984,1985, and 1986. Maintaining program participation percentages is an important finding in view of the fact that nationally, the number of FFA members and vocational agriculture programs have steadily declined since 1977.

VOCATIONAL AGRICULTURE TEACHERS

On the average, teachers who participated in the BOAC program were 37.3 years old (SD = 10.4); primarily from multiple teacher departments,72%; taught 13.1 years (SD = 9.3); and taught at the same school for 10.1 years (SD = 7.6). They were not significantly different from non-participating teachers who were 37.4 years old (SD = 10.6); primarily from multiple teacher departments, 64%; taught 12.6 years (SD = 9.6); and taught at their same school for 8.8 years (SD = 7.1).

The BOAC participating teachers, on the average, belonged to more professional, civic, and agricultural organizations than non-participating teachers. Membership in educational organizations revealed the only organizational membership significant difference as indicated in Table 1. Additionally, 57% of the teachers who advised BOAC programs held a greater number of higher offices, President or Vice President, in the organizations than did non-participating teachers, 38.4%. However, no significant differences were found between the teacher groups for the number of leadership positions held.

Teachers not formally involved in the BOAC program were involved in teaching and supervising community development activities. Ninety-six percent of all the teachers included community development as part of their instructional program. A variable for teaching community development was created with 1 = teaching more than 50 hours and 0 = those teaching less than 50 hours. Using analysis of variance, including the weighted FFA region variable and the participation/non-participation variable, no differences were found by FFA region or level of participation. This indicates that teaching community development as part of the vocational agriculture curriculum is widespread and a teaching activity of those who participated as well as those who have not participated in the BOAC program.

As expected, there was a significant difference, $t = 2.53$, $p < .01$, in the mean number of hours teachers spent supervising community development projects. On the average, BOAC participants spent 80.28 hours, SD = 70.3, supervising projects compared to 54.20 hours, SD = 62.3, for non-participants. This finding implies that non-participants in the BOAC program carried out community development projects but chose not to report the project as a BOAC project.

Table 1
Differences Between Educational Organizational Membership, Leadership, and BOAC Participation

Item	n	X	SD	t	df	prob.
Number of Ed Organizations						
Participants	73	3.07	2.06	3.11*	158	0.002
Non-participants	87	2.13	1.77			
Number of Leadership Positions						
Participants	63	3.60	2.37	0.78	133	0.435
Non-participants	72	3.27	2.44			

Note. Mean differences existed at the $p < .10$ level. Non-participants and sometimes participants were combined for the analysis.
Leadership position scale: President = 6; VP = 5; Secretary = 4; Treasurer = 3; Chair = 2; Other = 1.

FFA CHAPTERS, SCHOOLS, AND COMMUNITIES

Participating BOAC FFA chapters had 93% of the vocational agriculture students as members compared to only 65% membership for non-participating chapters. The mean number of members for participating chapters was 70 (SD=47) and for non-participants, the mean was 51 (SD=31). A significant difference between the two groups was found, t= 3.22, $p < .05$. Participation in the BOAC program was significantly associated with participation in other FFA programs at the $p < .05$ level. There was a low association with participation in: parliamentary procedure, Cramer's V=.19; energy challenge, Cramer's V=.19; proficiency awards, Cramer's V=.23; extemporaneous speaking, Cramer's V=.25; and prepared speaking, Cramer's V = .29. Moderate associations significant at the $p < .05$ level existed between participation in the BOAC program and participation in the Chapter Contest program, Cramer's V = .38, and for participation in the Safety Contest program, Cramer's V = .47. Three variables that most distinguished BOAC participants from non-participants were the levels of award recognition for the FFA Chapter Safety program, Chapter Award program, and Food for America (Table 2). The variables were coded from 0 to 5, with 5 being the highest award level, National gold recognition. Participation (coded 1) and non-participation (coded 0) was the dependent variable.

There was a significant difference (t=3.44, $p < .05$) found between the mean number of State Farmer FFA Degrees (X=26, SD=23) earned by BOAC participating chapter members compared to BOAC non-participating members who earned an average of 15 (SD=18) State Degrees over the same 10 year period. Per FFA chapter, BOAC participants earned twice as many American Farmer Degrees (X=2.08, SD=3.33) as non-participants who earned on the average .91 American Farmer Degrees (SD=1.6). A significant difference also existed between these two group means, t=3.02, $p < .05$).

BOAC projects were most often conducted in comprehensive high schools and in small rural communities with populations of 2,500 to 5,000 people, particularly in the Central FFA region and the Eastern region. In the Western FFA region, BOAC programs were more likely to occur in communities with 100,000 people or more. School type and community size were not associated with BOAC participation.

Table 2

Multiple Regression Analysis of Major FFA Chapter Activities for Participating FFA Chapters

Dependent variable: Whether or not FFA Chapters participated in BOAC

Multiple R	.60625
R Squared	.36754
Adjusted R Square	.35059
Standard Error	.40371

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	3	10.60785	3.53595
Residual	112	18.25422	.16298

F = 21.69506 Significance $p < 0.0001$

---- Variables in the Equation ----

Variable	B	SE B	Beta	T	Sig T
Chapter Safety Award	.10573	.02839	.34667	3.725	.0003
Chapter Award Program	.07412	.02865	.23536	2.587	.0110
Food for America	.02953	.01318	.18105	2.240	.0271
(constant)	.06960	.06960	.884	.3786	

BOAC RESOURCES, INPUTS, AND OUTCOMES

Inputs for the BOAC program included materials, inservice education, personnel, and financial resources. The materials and inservice education sessions were available to all vocational agriculture instructors and FFA chapters regardless if they participated in the BOAC program to the fullest extent, that fullest extent being completing an application and receiving recognition. Both participants and non-participants rated the materials and educational sessions positively and indicated use of the materials.

Sixty-four of the 92 teachers who participated in the BOAC program reported the following average numbers for people involved in a project: 38 FFA members at 6.1 hours each, 2.5 other organizations, 39.5 other people contributing 187 hours per project. Financially, local FFA chapters contributed from $0 to $1000, for an average contribution of $238 per project. Other financial sources contributed from $0 to $50,000. Excluding the one $50,000 grant, the total average dollar amount contributed to operate a project was $1,047. Extrapolated to all 1500 BOAC chapters, this is a total of at least $1.6 million raised plus 300 man-days of contributed labor.

Participants were asked to categorize their projects according to the 12 types of projects described in the BOAC teaching materials. More than one category could apply to a project. The most frequent type of project conducted by 61 participants was one which improved the public environment, such as installing street signs or establishing a rescue system. This was followed by community service types of activities (53) and natural resource related activities (38). The fewest number of projects developed agricultural economic/employment opportunities (20) and contributed to energy conservation (17).

On a scale from 1 (most important) to 10 (least important), participants indicated that improving FFA citizen participation was the most important outcome of the program (X=3.26). The least important outcome was improving agricultural income in the community (X=8.23).

CONCLUSIONS

The following conclusions are warranted from the study:

1. Formal participation in the BOAC program has been limited to 20% of the FFA chapters or less due to the need for an awards application to be completed. More community development education and activities are being conducted by vocational agriculture programs than is evident from National FFA records based on the completion of a BOAC awards application.

2. Vocational agriculture teachers who are more involved in the community and the profession as well as FFA chapters that are active in most of the other FFA programs are most likely to participate in the BOAC program to the fullest extent. Participation in the community and other activities compliments participation in the BOAC program.

3. The number of years of teaching, the number of teachers in the department, the type of school, or size of the community are not characteristics which influence participation in the BOAC program. BOAC programs have been successfully conducted in a multitude of situations.

4. Vocational agriculture programs with higer percentages of student FFA membership and FFA chapters which involve themselves in other state and national programs are very likely to be participants in the BOAC program.

5. In general, student hourly committed to the BOAC program/community development activities is very little, 5 to 6 hours per student per year, in comparison to other school and FFA activities.

6. According to the participants, the BOAC program is cost affective and achieving its primary goal of developing citizenship in students while at the same time, enabling vocational agricultural education programs and communities to benefit from the students learning experience.

RECOMMENDATIONS

1. Efforts should be made to revise the reporting of community development activities to better reflect the efforts of vocational agriculture program contributions to agriculture and the community.

2. BOAC inservice activities need to be targeted to states with large numbers of FFA chapters and small percentages of BOAC participation. Work needs to continue in the Central FFA region. However, efforts should especially be increased in the Western and Southern regions.

3. Inservice activities should focus on assisting teachers establish community relations with individuals and organizations as well as encourage community activities that are more than service projects and consider the economic needs of agriculture in the community.

4. Students and teachers need to be provided ideas as to how to integrate the BOAC program into the vocational curriculum so that it is used as a tool for learning and public relations rather than as an extra activity to be completed.

5. Further research is needed to determine the long range benefits from student participation in

community development activities.

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CHARACTERISTICS AND ACTIVITIES OF VOCATIONAL AGRICULTURE TEACHERS AND FFA CHAPTERS RELATED TO PARTICIPATION IN COMMUNITY DEVELOPMENT

A Critique

Larry E. Miller, The Ohio State University -- Discussant

BOAC has helped focus attention on community development activities conducted by FFA chapters. There is no doubt that, given the nature of the rural economy, much needs to be done in the area of community development. We do need to evaluate and validate the efforts which have been conducted in order to learn how to be even more effective in these activities. We need to establish whether or not BOAC is driven by its educational objectives or by the availability of dollars, awards and the opportunity for competition. This is one of the first efforts I have seen to examine these objectives on a national scale.

Some of the questions I have about the study are:

Was the evaluation of resource material a part of the objectives of the study? I saw it mentioned in the middle of the paper, but not anywhere else.

Does completing an application equal participation in community development activities, or the BOAC program? The authors actually concluded that this was not the case, but this resulted in frame error for the study and contaminated the results.

What were the "selected variables" used for making the comparison for the control of non-response bias?

I must admit I did not understand what was meant by "Twelve individual scales were created...", on page 3, and believe this needs greater clarity. I had a similar problem with Limitation #1, since I do not believe, given the sampling procedure, that the study could be generalized to "teachers" anyway.

Technically, my copy of Table 1 had the headings all messed-up.

With Table 2, data with multiple regression is reported. Multiple regression assumes continuous, interval data for the dependent variable. You will note that the dependent variable was "Whether or not FFA Chapters participated in BOAC," which would be a categorical variable. The authors might wish to reanalyze the results with discriminant function analysis, or probit analysis.

I believe this paper only touches on the results of a broader study because some of the objectives do not seem to be addressed in this paper. I would like to suggest that the authors more carefully proofread their paper as there are numerous typographical, style, and spelling errors.

I believe this exploratory study will surely provide "food for thought" and encourage others to start to more systematically examine the outcome of community development activities.

CURRENT STATUS OF WOMEN TEACHERS OF VOCATIONAL AGRICULTURE IN OHIO AND THEIR PERCEPTIONS OF THEIR PLACE IN THE PROFESSION

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INTRODUCTION

With the enactment of Title IX and later Title II of the Educational Amendments, the federal government took decisive action in an attempt to eliminate or at least reduce in some significant way sex bias, stereotyping and discrimination. Many programs have been created to involve women and men in areas that are not traditional for their sex. However, there has been a general tendency for programs to receive less attention in recent years, presumably because of the success of those efforts. In Ohio during the 1970's, there was a steady increase in the number of women teaching vocational agriculture. Over the last few years, however, that number plateaued and even diminished somewhat. Add to that the fact that women have not at this point been involved in any significant way in the professional organizations of teachers of vocational agriculture, and a cause for concern arises.

The initial studies of women vocational agriculture teachers suggests that there is a place for them in the profession (Moore, Kite, & Thomas, 1979; Ries, 1980). Ries (1980) found that the decision of females to pursue the teaching of vocational agriculture was influenced by their perceptions of bias in the profession. Numerous techniques have been identified which are effective in aiding women in countering the effects of bias and stereotyping (Knight, 1980). Two of the major strategies that offer special opportunity for success with women who teach vocational agriculture in Ohio are the use of role models and support groups (Kane, 1978; Knight, 1980). In the preparation of teachers of vocational agriculture who are female, special attention must be given to these two strategies. The most appropriate source for both come from the ranks of those women who are currently teaching. However, without an understanding of where the women who teach are in terms of their status and experience, it will be difficult to provide the kind of role models and support that undergraduates or the teachers themselves will need.

PURPOSE AND OBJECTIVES

> **What is the current status of women who teach vocational agriculture in Ohio, and what are their perceptions of their place in the profession?**

In order to find a solution to the major concern, answers were sought to the following questions:

1. According to women teachers of vocational agriculture in Ohio, what is their status regarding the following factors:

a. Experience as a student of vocational agriculture and as a member of FFA and 4-H.

b. Method of preparation to be a teacher of vocational agriculture.

c. Years of teaching vocational agriculture.

d. Time commitments to teaching beyond the contractual working week.

e. Marital status.

f. Number of children.

g. Income level

h. Current location of residence in relation to homes where the teacher and spouse grew up.

i. Participation in professional and other organizations.

2. How do women teachers of vocational agriculture in Ohio describe their experiences regarding the following factors:

a. How they learned about and obtained their current position.

b. Work activity commitments during a typical week.

c. Sexual discrimination and harassment.

d. Personal and professional difficulties.

3. How do women teachers of vocational agriculture in Ohio describe the following:

a. Their personal, professional and academic goals for the next five years.

b. Their perception of what can be done to make the teaching of vocational agriculture more rewarding for women.

PROCEDURES

This was a descriptive study of the women teachers of vocational agriculture in Ohio. Since there were only 43 women teachers, it was determined to include all in the study. The questionnaire which was developed and utilized in this study was reviewed by a panel of experts and field tested. The instrument was adjusted based upon the results of that effort and then used to gather the data. The data analysis includes the basic descriptive statistics but no inferential statistics since the entire population was included in the study.

RESULTS

Thirty-eight (88%) of the 43 women who teach vocational agriculture in Ohio responded to the questionnaire. The five non respondents chose not to participate even after two follow up attempts. Following are some of the basic findings of the study regarding the status of those who responded. The results will be presented by objective.

Objective 1: Status on Selected Factors

1. Seventy-two percent had no experience as a student of vocational agriculture, and 46% had no experience in 4-H.

2. The teachers had an average of four years of agriculture work experience, and 56% become teachers through the regular certification route.

3. Fifty-one percent had taught five years or less, and most reported spending four and five hours per week in supervision of occupational experience programs and FFA activities respectively.

4. Fifty-four percent were married and earned an average of $21,611 annually. For those who were married, the most frequently reported distance they lived from the home where their spouse grew up was 1 mile. Sixty-four percent reported having no children, 18% have one child, and 13% have two children.

5. About 60% were members of the Ohio Vocational Agriculture Teachers Association, and 50% belong to the Ohio Education Association.

Objective 2: Experiences

1. Eighty-one percent learned of the opening for their current position through the traditional methods of a school announcement, university contact or a state supervisor contact, and 83% went through a rather traditional interview process.

2. All responded that they performed the traditional activities of teachers of vocational agriculture, and many complained about the time commitments and the amount of paperwork required.

3. Thirty-one percent reported that they had been discriminated against at some point in their career, and 29% reported as having been harassed. Generally, the examples given about discrimination related to hiring practices to which they had been exposed. Harassment examples given by the respondents generally centered around sexual innuendo.

4. Forty-three percent expressed the traditional difficulties generally reported in the literature by other teachers of vocational agriculture such as trouble with administrators, low enrollments, unmotivated students, low salary and lack of time to meet all the demands of teaching vocational agriculture. However, 36% reported such concerns as not being taken seriously, feeling excluded and balancing household chores with the professional demands. An additional 9% expressed concern about living up to the "good" vocational agriculture teacher image.

Objective 3: Goals and Needed Support

1. Goals:

   a. In terms of professional goals, 60% reported that they would like to continue to teach and improve their programs during the next five years. Twenty-eight percent would like to move into administration, supervision or advance within their current position or profession. Ten percent want to leave vocational agriculture.

   b. In terms of academic goals, sixty-seven percent want to obtain an advanced degree. An additional 21% specifically want either a degree or certificate in another area of teaching.

   c. In terms of personal goals, 68% expressed goals related to family concerns such as getting married, having children and improving their home. Nineteen percent reported a desire to travel or do other things for self fulfillment.

2. Eighty-one percent expressed a need for support and encouragement from family, colleagues, administrators and leaders. Generally, comments were centered around the need for simple "words of encouragement" from others. In addition, 81% expressed the desire to have an annual meeting just for women teachers of vocational agriculture.

CONCLUSIONS AND RECOMMENDATIONS

As might be expected, women teachers of vocational agriculture generally reported little or no experience as students of vocational agriculture or as FFA members. They appear to spend time much as male vocational agriculture teachers as reported in other studies. Since most have taught less than five years, they tend to be a relatively young group of people with just over half being married. About 60% are members of the OVATA, but one-half belong to the Ohio Education Association and the parent organization, the National Education Association (NEA).

Nearly all women teachers of vocational agriculture learned about and procured their teaching position through the normal methods. Many, 31% and 29% respectively, reported experience with sexual discrimination and harassment. In this day and age, these kinds of numbers give cause for concern. Many (43%) expressed the traditional concerns faced by all vocational agriculture, but over one-third added concerns that appear to be somewhat unique to women teachers.

Many (60%) want to continue in the profession for the next five years, and about one-third (28%) want to pursue administration or supervision. One-One-tenth simply want to leave the profession. Nearly all are interested in pursuing advanced education either in agricultural education or other areas of study. From a personal standpoint, slightly over two-thirds have goals related to marriage and family.

Nearly all expressed a need for encouragement for their work as teachers of vocational agriculture. One way of meeting this need is through support groups and networks. This probably explains, to a large degree, the strong desire of the respondents to have an annual meeting just for women teachers of vocational agriculture.

Based upon the findings of this study and the related literature, it would appear that in Ohio it will be important to provide some sort of special support for women who teach vocational agriculture. It appears that if they are to remain in the profession, be successful, serve as role models for undergraduates and become or remain professionally active, it will generally be important to make overt efforts to assist them. Some of the areas needing assistance are the very traditional concerns of all teachers of vocational agriculture such as time commitments and paper work. However, there appears to be some unique areas which trouble the women teachers more such as coping with stereotypes, harassment and greater household responsibilities. This assistance can and should come from families, administrators, other teachers, the teachers' organization, the state staff and teacher education alike. It is clear that more women can and need to be involved in the teaching of vocational agriculture, and this study affirms the need to offer overt and active support for them.

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CURRENT STATUS OF WOMEN TEACHERS OF VOCATIONAL AGRICULTURE IN OHIO AND THEIR PERCEPTIONS OF THEIR PLACE IN THE PROFESSION

A Critique

Jeffrey W. Moss, Louisiana State University -- Discussant

Our profession, unfortunately, has not rid itself of discrimination, sex bias, and stereotyping, and thus after ten to fifteen years of "progress" there is more to be done in Ohio as indicated by Dr. Knight. I suspect that the problem is manifested in other states as well. The study provides information on status and perceptions of women teachers in Ohio which should be helpful in planning activities or programs to reduce sex bias and discrimination. Hopefully, those concerned will follow through with overt support as suggested by Dr. Knight.

Strengths of the Research Paper. The introduction of the paper succinctly describes the rationale for conducting the research and why there is cause for concern in Ohio. The three objectives of the study are pertinent to the overall purpose and valuable descriptive information has been collected. The results of the study thoroughly address each research question and data has been presented on all factors of inquiry. I would commend Dr. Knight for his thoroughness in presenting the findings of the study. Furthermore, the conclusions are appropriate and based upon the findings.

Limitations of the Research Paper. In the review of related literature which seeks to establish the theoretical framework for the research, only a limited number of initial studies are cited. All citations are from a two year time period (78-80) with no reference to any research efforts or programs to reduce sex bias occurring during the past seven years. I believe the rationale for conducting the research could have been strengthened by a synopsis of more recent attention given to the problem not only within agricultural education but in related vocational program areas as well.

While the procedures for conducting this descriptive study and analyzing the data collected are sound, additional information as to the type of questionnaire used to collect the data (closed form or open-ended questions) was of interest but not elaborated upon in the paper. I was also interested in knowing when the study was conducted and specific reasons (if any) why five teachers of the population of 43 chose not to participate in the study.

As previously mentioned, the conclusions presented in the paper are appropriate to the findings. Though not an objective of this study, I was interested in how membership in professional organizations compares with participation by male counterparts in Ohio.

Summary. The recommendations address some unique areas of concern to women teachers which could be used to plan appropriate support activities. I'm sure that our colleagues in Ohio will follow through with active support. I hope that the remainder of us in the profession will also direct attention toward eliminating this problem.

DISCRIMINANT VALUES OF PROFESSIONAL AND COMMUNITY LEADERSHIP ACTIVITIES OF VOCATIONAL AGRICULTURE TEACHERS AS THEY RELATE TO TEACHER USE OF EFFECTIVE TEACHING PRACTICES

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INTRODUCTION

Research in the realm of teaching effectiveness has proven to be extremely difficult. Early efforts to scientifically examine teacher behaviors and their relationships with teaching effectiveness frequently led to conflicting findings and inconclusive results (6, p.657). Current research efforts, however, are beginning to identify some characteristics of effective teaching which tend to contribute to learning, and educational researchers are beginning to find ways to scientifically measure and correlate teaching behaviors and characteristics with teaching effectiveness. A critical need exists at this time to identify "master teachers of vocational agriculture", and to describe them in terms of research based behaviors and characteristics.

PURPOSES AND OBJECTIVES

This study was designed to identify and describe leadership characteristics of vocational agriculture teachers who demonstrated superior implementation of effective teaching practices. The specific objectives were:

1. Identify teacher effectiveness behaviors which distinguished superior vocational agriculture teachers.

2. Identify leadership characteristics of teachers which discriminate between most effective and least effective teachers of vocational agriculture.

PROCEDURE

This study was national in scope. Teachers were identified from the list of vocational agriculture teachers published in the 1986 Agriculture Teachers Directory (1). The total population consisted of 10,200 teachers.

An adequate sample size was determined to be 510 secondary vocational agriculture teachers. A substitute procedure as described by Chapman (3 p. 46-61) was used for this study.

A stratified random sample was selected by computer using a random number program. A proportionate sample was selected from each state according to the number of active secondary teachers who were engaged in teaching within that state. The computer listed the teachers in the order in which they were selected. Five percent of the population was designated to be the primary sample based on their rankings on the computer listing. The next three and one-half percent of the teachers on the computer list were designated as substitute respondents, and were used only to replace units from the primary sample for which no response was received. Nonrespondents were replaced by substitutes from the same state and/or region (as designated by the national organization of Future Farmers of America organization).

The research instrument used in this study was adapted from an instrument developed by Rheault (5). It was designed to assess the extent to which vocational agriculture teachers used research based teaching effectiveness techniques in their teaching activities. It also addressed demographic characteristics of the teachers. The instrument was validated by mailing it to ten vocational agriculture teachers who were not among those selected as study participants.

Teaching techniques were assessed by asking the teachers to respond to forty statements which described specific teaching behaviors. The respondent was asked to provide information about what he/she actually does while teaching based on a Likert scale from one (Never) to nine (Always). The statements were based on the SIM (2) summary of validated research on teaching effectiveness compiled at Iowa State University.

Data collection commenced September 27, 1986. A follow-up procedure was initiated on October 26, 1986. The number of instruments returned by the 510 teachers who were included in the primary sample was 296 for a response rate of 58.0 percent.

Fifty nonrespondents were randomly selected for a separate follow-up to determine if mean scores of respondents were different from those of nonrespondents. The original instrument was coded and mailed with an accompanying cover letter and self-addressed, stamped envelope on November 20, 1986. Nineteen responses were received from this mailing.

Two groups of teachers were identified using composite scores from teacher responses to the forty statements on teaching activities. Teachers whose self rated performance scores were located one standard deviation or more above the mean composite score for all teachers were characterized as being effective teachers. Teachers whose scores were located one standard deviation or more below the mean composite score for all teachers were characterized as lacking effective teaching behaviors. These two groups of teachers were used in making comparisons among the demographic variables.

ANALYSIS OF DATA

Forty statements were derived from a list of teaching practices which were research validated by the Iowa State University SIM (School Improvement Model) research project (2) as contributors to effective teaching. The instrument was analyzed for reliability using Cronbach's alpha coefficient of reliability. A strong reliability coefficient of .86 was observed using this procedure.

The decision to use the replacement technique to obtain the desired sample size was based on the assumption that no differences would be found among respondent, replacement, and nonrespondent mean responses to the 40 teaching techniques listed on the survey instrument. The T-test procedure was used for this analysis. Responses were obtained from 296 teachers who were originally identified as primary respondents. In addition, 198 respondents who were selected as replacements were included in the data analysis. Total sample size was 494 teachers. The composition of the sample was 59.9% primary respondents and 40.1% replacements. Nineteen nonrespondents were compared with primary respondents for differences.

The SPSSx t-test and discriminant analysis procedures were used to test for relationships between high and low teacher effectiveness groups and demographic variables. These procedures were selected because they were compatible with the kinds of data gathered and the rules associated with substitution sampling procedures.

Total response scores, mean scores, standard deviations, frequency counts and variable listings for each sample unit and for each of the forty teaching techniques were calculated using the SPSSx procedures COMPUTE, RECODE, REPORT, AND FREQUENCIES.

RESULTS

A t-value of -1.18 (t prob.=.24) was observed for the test between group composite mean scores for primary respondents (x=281.59) and replacement respondents (x=283.97). It was further observed that a t-value of .61 (t prob.=.54) was derived as a result of a test between the total sample group mean score (282.55) and the nonrespondent group mean score (278.0).

The first objective of this study was to identify research validated teacher effectiveness behaviors. The SIM (2) research project at Iowa State University was the source of the teaching behaviors which were used. Each of the effective teacher behaviors which the study identified was referenced to the original research efforts upon which the validation for that behavior was based. Conclusive evidence was available in support of each of the teacher behaviors identified through the SIM project. Teacher behavior statements were formulated to measure the degree to which teachers used the behaviors in their teaching activities.

The second objective of this study was to identify leadership characteristics of vocational agriculture teachers which discriminate between most effective and least effective teachers of vocational agriculture. Mean scores and standard deviations for the high and low teacher groups for each of the teaching practices which were considered are summarized in Table 1.

Significant relationships were found between teacher groups for each of the demographic variables associated with teacher membership and leadership roles in organizations. These findings revealed that each of the leadership and membership factors which was studied was found to significantly discriminate between the two teaching effectiveness levels. These results are reported in Table 2.

CONCLUSIONS AND RECOMMENDATIONS

Sufficient research evidence is available to identify some effective teaching practices. The Iowa State University SIM project has identified effective teaching behaviors upon which this study is structured. These behaviors were identified through an extensive search of the literature for sound research efforts which assessed teaching/learning processes. The results included a listing of teacher performance activities which were documented as having positive impacts upon learning by students. Based on the literature review, it is reasonable to expect that these behaviors apply to teaching in the vocational agriculture setting.

Teacher activities associated with memberships in teacher and community organizations, and teacher leadership roles within those organizations were all found to be significant discriminators between levels of teacher effectiveness. Memberships in professional organizations (F-prob.=.006) may reflect teacher attitudes toward the profession and/or toward other teachers. Effective teachers held memberships in 4.6 professionally related organizations whereas less effective teachers were members of 3.41 of these organizations. The effective teacher group had filled an average of 1.75 leadership roles within professional organizations. The less effective teachers had averaged 1.55 leadership roles in professional organizations (F-prob.=.03) The level of participation in leadership activities may be an indicator of the level of commitment the teacher had toward people and activities associated with the organization. It may also reflect an aptitude on the part of the leader for planning and organizing activities. A similarity exists between productive teaching activities and effective leadership activities.

Memberships in civic organizations (high group mean= 1.52, low group mean= .95, F-prob.= .006) may aid the teacher in gaining acceptance in the community, and provide an opportunity to develop a commitment to the community and its citizens.

Civic organization leadership roles (high group mean= 1.06, low group mean= .66, F-prob.= .02) reflect an element of trust and respect for the teacher on the parts of local community business people and leaders. These same feelings between students and their teachers are thought to be essential components of the teaching/learning process.

Leadership roles in farm organizations (high group mean= .35, low group mean= .12, F-prob.= .004) and government agencies (high group mean= .33, low group mean= .12, F-prob.= .008) probably reflect teacher aptitudes for leadership activities and high levels of commitment to the ideals and programs of the organizations. Attributes such as these could well be found in the literature as descriptive terms for competent teachers.

Teachers of vocational agriculture could benefit directly from this research by cultivating, adopting, and practicing sound leadership principles in their lives and work.

Perhaps the greatest weakness of this research was the use of an instrument which gathered data through self-analysis by the teachers. Future research should include the use of a companion instrument to be used by the teachers' administrators and/or peers to eliminate this source of bias.

Researchers should continue to probe for additional techniques which are associated with effective teaching/learning. Additional studies should be conducted to further refine the teaching techniques into more reliable and stronger measurement tools. Similar studies should be conducted within states to determine strengths and weaknesses of local vocational agriculture teachers in comparison with national and regional norms. Other research should address methods of effectively implementing research findings into the teachers' teaching habits and routines. Implementation of effective teaching practices needs to receive as much attention as does the discovery of new information.

Table 1. Means and standard deviations for forty teaching techniques for high and low teacher groups.

Instrument item		Groupc	
		High	Low
Plan and outline your lessons including key points and and learning objectives prior to teaching.	Ma	7.75	5.97
	SDb	1.25	1.74
Avoid discussions which lead away from the lesson objectives.		6.65	5.86
		1.67	1.51
Motivate students by challenging them to raise their scholastic and personal expectations.		8.37	6.44
		.82	1.29
Encourage students to challenge and discuss relevant issues.		8.07	6.42
		.98	1.35
Provide written comments when evaluating student performances.		7.21	4.69
		1.51	1.68
Construct tests which measure the student's understanding of the lesson objective.		8.41	6.92
		.72	1.25
Keep abreast of new developments within your subject matter area.		8.20	6.72
		.84	1.24
Use learning activities which are designed to achieve the stated objectives for the course.		8.31	6.56
		.72	1.10
Use a variety of teaching techniques to accommodate differences in student learning styles.		8.27	6.22
		.91	1.25
Require students to make an accounting for the ways they use their time.		7.24	4.31
		1.43	1.70
Provide learning activities which reflect the abilities of individual students.		7.76	5.60
		.98	1.40
Start your classes on time.		8.44	6.90
		.72	1.47
Establish a set of procedures to manage student behavior.		8.57	6.79
		.66	1.38

Clearly communicate and enforce the expected standards of behavior with all students.	8.76 .49	7.06 1.19
Adjust the physical arrangements of the classroom to provide for a variety of learning activities.	8.17 1.05	6.14 1.72
Willingly participate in school activities which require a commitment of your personal time and effort.	8.48 .98	6.93 1.42
Set aside time to provide individual help to students.	8.23 .89	6.25 1.42
Provide constructive criticism and positive reinforcement in evaluating the work of students.	8.39 .68	6.72 1.20
Tolerate situations which may lead to student embarrassment or ridicule.	1.65* 2.23	2.85* 1.82
Allow students to help establish classroom rules and behavior standards.	5.08 2.19	3.58 1.72
Demonstrate punctuality in your personal work habits.	8.28 .80	6.46 1.51
Participate in teacher inservice activities.	8.64 .73	7.49 1.51
Get involved in enforcing school policies and regulations.	8.52 .78	6.69 1.75
Willingly participate on faculty committees.	8.36 1.04	6.06 1.93
Use long range plans to guide the improvement of your program.	8.15 .82	6.15 1.68
Develop course activities which reflect "lifelike" situations.	8.39 .63	6.33 1.18
Motivate student effort by recognizing individual achievements.	8.59 .60	6.74 1.04
Experience difficulty with students who do not understand and follow directions.	3.36* 1.94	4.19* 1.33
Critique student work for strengths as well as weaknesses.	7.83 .81	5.93 1.35
Use the same set of testing materials every year.	1.93* 1.73	3.49* 1.68
Maintain and use a variety of good references and periodicals.	7.97 .93	6.42 1.38

Select learning activities which supplement established curriculum objectives.	8.17	6.40
	.74	1.16
Identify student capabilities and seek learning activities which will motivate and challenge them.	8.11	5.92
	.73	1.05
Actively supervise learning activities in the shop or laboratory.	8.71	7.82
	.61	.85
Accept student performance which you know is below the level of student capability.	2.13*	3.44*
	1.74	1.52
Monitor student use of materials and resources to avoid waste.	7.79	6.72
	1.43	1.22
Maintain a clean, tidy personal office or work space.	7.05	5.06
	1.54	1.76
Ignore minor violations of school policy and student behavior standards.	2.24*	3.74*
	2.34	1.43
Adapt readily to changing situations occurring within the classroom environment.	7.87	6.11
	.91	1.16
Feel enthusiastic towards your work.	8.36	6.60
	.80	1.13

*Actual responses before reading

[a]Mean

[b]Standard deviation

[c]High - teachers are one SD to the right of the mean, low - teachers are one SD to the left of the mean.

Table 2. Discriminant analysis means, standard deviations, F-values and correlation coefficient on effects of teacher membership and leadership activities by group

Factor		Group[c]				
		Low (N=58)	High (N=48)	Wilks' lambda coeff.	F-value	F-prob.
Number of memberships in in professional organizations	M[a]	3.41	4.60	.93	8.00**	.006
	SD[b]	1.94	2.39			
Number of memberships in civic organizations		.95	1.52	.93	7.94**	.006
		.94	1.15			

Number of leadership roles in professional organizations	1.55	1.75	.96	4.60*	.03
	.50	.44			
Number of civic leadership roles	.66	1.06	.95	5.76*	.02
	.83	.93			
Number of government related leadership roles	.12	.33	.93	7.34**	.008
	.33	.48			
Number of leadership roles in in farm commodity organizations	.12	.35	.92	8.69**	.004
	.33	.48			

[a]Mean
[b]Standard deviation
[c]High - teachers are one SD to the right of the mean, low - teachers are one SD to the left of the mean.
*Significant at .05 level.
**Significant at .01 level.

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DISCRIMINANT VALUES OF PROFESSIONAL AND COMMUNITY LEADERSHIP ACTIVITIES OF VOCATIONAL AGRICULTURE TEACHERS AS THEY RELATE TO TEACHER USE OF EFFECTIVE TEACHING PRACTICES

A Critique

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Much effort has been undertaken in the last five to ten years to clarify the meaning of teacher effectiveness. We must continue to research and reflect upon the meaning of teacher effectiveness and how it may best be achieved. This study sought to identify teacher effectiveness behaviors and leadership characteristics which distinguish superior vocational agriculture teachers. The national scope of the study could eventually lead to the development of an identified norm group of agricultural teachers. Instrument validity was generally addressed in the paper, and a reliability coefficient of .86 was calculated for internal consistency. The list of 40 teacher behaviors was derived from synthesis work completed at Iowa State University. I felt that teacher self-analysis of the 40 teacher effectiveness behaviors was an appropriate and credible technique of data collection, given the nature of the statements contained on the questionnaire. The authors compared respondent, replacement, and nonrespondent groups and found no significant differences.

Several suggestions and questions follow which are aimed at improving this paper and similar studies in the future. While I agree that we need to continually examine the effectiveness of agricultural teachers, the authors need to do a better job of developing a rationale for identifying "master teachers of vocational agriculture". The introduction focused upon teacher effectiveness, yet the stated purpose of the study dealt with leadership activities of effective teachers. What research problem was under investigation and what circumstances led to the problem in professional practice? The introduction should cite previous research and writing about teacher leadership activities, as well as other research on teacher effectiveness.

The sampling procedures in the study were unnecessarily cumbersome. While the data sample was listed as 494, apparently only 296 questionnaires (or 58 percent of the sample) were used in the analysis. Also, only 19 of the 50 nonrespondents sampled provided data, which raises some questions about generalizability. A key question is whether this study attempted to identify "effective teachers" or "the most effective teachers" from those surveyed. Is it true that teachers who have a summary score at least one standard deviation above the mean are "effective teachers"? What were the mean scores for the high and low groups? And finally, should effective teaching be defined differently for agricultural teachers as opposed to other teachers? The 40 item scale seemed to be generic, with the possible exception of one item. The discussion of the discriminant analysis results was incomplete and somewhat inaccurate, speaking of significant relationships at times. In general, I felt the conclusions were too suggestive, while no recommendations for practice were presented. Finally, the suggestions for additional research should also address possible leadership linkages with teacher effectiveness.

EDUCATIONAL STRATEGIES AND EXTENT OF COOPERATION WITH AGRI-EDUCATORS BY SELECTED AGRIBUSINESSES

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The agribusiness industry has become the world's biggest and most important business. The entire scope of agricultural activities is increasingly dependent on agribusiness. In addition to providing essential food and clothing, agribusiness "contributes about 20% to the gross national product and employs approximately 23% of the labor force." (Woolverton et al., 1985).

A developing role for agribusiness is in the educational field. Recent studies have indicated that more agribusinesses are serving as sources of educational information for farmers and vocational agricultural teachers (Hillyard, 1979; Johnson, 1982). The recent decrease in resources available to public agricultural education has stimulated interest in alternative delivery methods and cooperation between the public and private sectors.

There is a need to identify strategies used by agribusinesses in disseminating agricultural information and to determine the extent of cooperation between agribusinesses and agri-educators. More information is needed about the views of agribusinesses on the importance of supplying agriculture teachers with current information.

Exploration of different strategies used by agribusinesses to reach their clients with educational information would benefit agri-educators in their decision-making processes on programs and aid them in preparing students for positions in agribusiness. Information is needed about the willingness of agribusinesses to provide the educational materials, workshops, and cooperative ventures which can be an important supplement to the formal classroom setting (Harris, 1982).

PURPOSE AND OBJECTIVES

The purpose of this study was to explore the educational strategies used by three types of Iowa agribusinesses: livestock feed, chemical/fertilizer and seed. Objectives were to identify: 1) different educational strategies employed by the three types of agribusinesses, 2) extent of cooperation between agribusinesses and other educational agencies and 3) views of agribusinesses on the importance of supplying agriculture teachers with current information on selected agricultural topics.

PROCEDURES

The population for this study consisted of 555 companies representing three types of agribusinesses: livestock feed, chemical/fertilizer and seed as listed in the Directory of Iowa Manufacturers, Sixteenth edition, 1985-86. Approximately 15 percent of each population were randomly selected from the stratified sample. The resultant 84 samples included 33 livestock and feed, 40 chemical/fertilizer, and 11 seed corn businesses.

Survey instruments were mailed to company officials who were asked to rate on a 99 point scale their company's educational activities. After a follow-up of the nonrespondents, a return rate of 59.52 percent was obtained. Five of the nonrespondents were contacted by telephone bringing the sample population number to 79 persons and the return rate to 63.29 percent. The means and standard deviations of responses to seven items were checked for differences between non-respondents and respondents and little or no difference existed.

Graduate students and faculty of the Department of Agricultural Education at Iowa State University assisted in development of the instrument which was based on the literature review and on information gathered from industry officials. To check for content validity, the instrument was reviewed prior to use by agribusiness representatives from companies not included in the study. An analysis of reliability was not done because of the type of questions asked on the instrument.

A 99 point scale was used to help respondents express their level of understanding of their company's activities. Ratings from the 99 point scale were transformed in order to weight highly responsive differences in the ends of the scale and diminish responses at the center of the scale. (Wolins & Dickenson, 1973).

ANALYSIS OF DATA

Item responses were divided by 100 and transformed (PROBIT) to a z scale of normal deviates. With the transformation, a "99" response was replaced with 2.33, a "50" with 0.00 and a "1" with -2.33. To eliminate negative integers, the normal deviates were multiplied by 100 and added to a constant, 500, resulting in a scale in which 500 signified a middle position.

Mean scores and standard deviations were computed for each item. Frequency counts and percentages were used to analyze descriptive data.

Analysis of variance (ANOVA) for an unequal number within groups was employed to test differences among the three types of agribusinesses. The computer program, Statistical Analysis Systems (SAS), procedure (PROC GLM) was used. A post-hoc analysis using the Scheffe' multiple range test was carried out to determine differences among groups for F-values beyond the assigned level (alpha=.05).

RESULTS

The 50 Iowa agribusinesses in the study tended to be small and long established in their communities. Forty-two percent had ten or fewer employees and ninety-five percent had been in operation more than ten years.

The study used as independent variables three types of agribusinesses, livestock feed, chemical/fertilizer and seed as identified in the Directory of Iowa Manufacturers 16th Ed., 1985-1986. Results of analysis indicated that a majority of the agribusinesses did not concentrate on one product and many dealt in all three.

All types of agribusinesses reported substantial increases in their educational efforts since 1980 with a mean of 540.03 for livestock feed, 528.58 for chemical fertilizer and 538.14 for seed.

There were significant differences at the .05 level among the three types of agribusinesses for two educational strategies (Table 1), "farmers dropping in at business office" and "use of television." All other strategies were used similarly by the three types of agribusinesses. A high use of "farm and home visits" and "meetings" was reported by all types. A pattern of wide use of a variety of information dissemination strategies rather than heavy use of a few methods was observed.

Table 1. Group means, standard deviations, and analyses of variance relating to extent of use of information dissemination strategies by types of agribusiness

Strategy	Livestock feed	Chemical/ fertilizer	Seed		
	n Mean SD	n Mean SD	n Mean SD	F-value	Probability
Telephone conversation	17	24	8		
	501.75	521.19	491.49	0.49	0.61
	90.94	77.14	86.74		
Personal letter	17	21	8		
	441.20	463.23	447.27	0.36	0.70
	76.01	84.44	87.21		
Form letter	16	22	7		
	452.34	475.88	504.58	0.93	0.40
	104.70	74.25	76.50		
Farm (home) visits	16	24	7		
	596.37	595.04	540.01	1.02	0.37
	116.89	87.66	57.56		
Farmers dropping in at office	18	23	8		
	507.12	574.01	475.95	4.38	0.01**
	76.20	103.54	98.86		
Neighbors contacting neighbors	17	22	8		
	429.64	484.61	442.32	1.32	0.28
	95.48	114.89	118.16		
Contact through interns	11	19	6		
	339.76	374.40	353.79	0.46	0.63
	91.09	97.42	104.31		
Radio	15	22	7		
	482.41	414.13	421.75	1.99	0.15
	111.06	97.87	114.00		
Television	14	18	7		
	368.12	302.43	403.45	4.56	0.01**
	83.21	73.25	109.00		
Newspapers	17	22	8		
	493.68	470.90	462.64	0.38	0.68
	70.53	116.41	94.70		
Magazines/ periodicals	15	20	7		
	417.14	385.11	486.49	1.73	0.19
	123.81	139.35	58.92		

**Significant beyond the 0.01 level.

Strategy	Livestock feed	Chemical/ fertilizer	Seed		
	n Mean SD	n Mean SD	n Mean SD	F-value	Probability
Posters	17 443.49 136.40	22 387.80 105.48	7 404.17 130.04	1.02	0.37
Bulletins	16 424.50 140.90	22 411.47 108.73	7 439.34 89.39	0.16	0.85
Brochures	17 527.41 136.89	24 485.86 126.61	7 525.85 54.23	0.54	0.59
Newsletters	17 502.84 127.58	23 559.49 107.91	8 517.59 74.89	1.36	0.27
Catalogs	11 367.05 147.01	18 322.85 101.40	8 444.91 131.05	2.76	0.08
Flyers	14 430.29 137.14	22 412.59 110.28	7 446.31 98.04	0.25	0.78
Farm demonstrations/ plots	16 471.02	23 509.42	8 550.93	2.14	0.12
Sponsoring community program	16 453.55 91.92	21 442.33 102.98	7 404.38 98.84	0.62	0.54
Meetings	17 532.31 78.84	24 559.67 83.51	8 530.43 102.28	0.66	0.52
Exhibitions/ trade fair	13 472.56 107.52	21 401.25 136.41	8 482.77 101.48	2.00	0.15
Other	4 357.56 180.39	4 331.86 128.98	2 409.90 201.58	0.15	0.86

Means were relatively low for the variables related to cooperation between agribusinesses and other groups (Table 2). The extent of cooperation was rated as seldom with a grand total mean of 459.83. The standard deviations were high which indicated a wide variation in responses.

The low level of cooperation in this study is contrary to the high level of cooperation found by others (Bowen, 1986; Pascalar, 1986). The relatively low level of cooperation existing between agribusinesses, vocational agriculture programs and other educational agencies may be due to lack of opportunity for cooperation. Some of the agribusinesses may be geographically located at a distance from high school, area or university agriculture programs.

The programs listed in Table 3 are ones that were identified by a committee of teachers as topics to be considered for inservice meetings in Iowa. The agribusinesses in the study thought it was important to supply teachers with up-to-date information on all of these programs except for "hay and pasture management" and "wildlife management" which were rated as somewhat important.

All three types of agribusinesses rated "agricultural marketing" very highly with the following means: livestock feed (x=611.20), chemical/fertilizer (x=623.55), and seed (x=680.37). "New skills for new careers" was also rated highly by all. These findings agreed with the call for teachers to emphasize agribusiness entrepreneurship and marketing of agricultural products as reported by McCormick (1986) and Bowen (1986).

The Scheffe' test was used to find the significant difference (a=.05) between chemical/fertilizer and seed agribusinesses on the variable "diversification in agriculture." The reason for the strong interest of chemical/fertilizer agribusinesses in diversification may be due to pressures from the farm crisis and water quality concerns. Chemical/fertilizer agribusinesses may have more of a vested interest in diversification while the seed companies may prefer that concentration on corn and soybeans be continued.

Table 2. Means and standard deviations relating to the extent of cooperation among agribusinesses and other agencies in providing educational information

Education Agency	N	Mean ($\bar{X}$)	Std. dev.
1. Vocational agriculture adult program	46	445.91	84.96
2. Vocational agriculture--FFA program	46	482.37	90.58
3. Private individuals	48	511.79	106.52
4. Cooperative Extension Service	49	497.59	107.22
5. Other agribusinesses	48	459.20	89.38
6. University or area college agriculture departments	47	478.71	99.69
7. Chamber of Commerce	43	435.18	97.72
8. Soil Conservation Service	44	432.03	101.19
9. Farmer's Home Administration	45	408.44	107.30
10. Agricultural Stabilization and Conservation Service	44	447.08	123.77
Grand mean	46	459.83	100.83

Table 3. Group means, standard deviations, and analyses of variance relating to the perception of agribusinesses in supplying up-to-date information to agriculture teachers

Agricultural program	Agribusiness types			F-value	Probability
	Livestock feed	Chemical/ fertilizer	Seed		
	n Mean SD	n Mean SD	n Mean SD		
1. New skills for new careers in agriculture	18	23	8		
	586.33	596.675	621.07	0.61	0.54
	64.66	81.32	72.77		
2. Soil conservation and tillage	17	23	8		
	589.66	549.09	577.01	1.12	0.33
	89.72	86.34	80.60		
3. Farm chemicals	17	23	8		
	596.92	599.99	551.83	0.93	0.40
	84.33	99.78	59.47		
4. Computer (remote data base)	18	22	8		
	556.50	583.12	549.96	0.96	0.39
	80.84	71.89	46.89		
5. Crop scouting and entomology	16	23	8		
	538.87	537.14	556.30	0.19	0.82
	75.64	85.70	41.43		
6. Diversification in agriculture	17	23	8		
	565.18	623.99	563.43	3.06	0.05*
	99.17	80.52	38.09		
7. Hay and pasture management	17	23	8		
	503.40	476.74	491.57	0.47	0.63
	81.27	93.84	72.53		
8. Farm safety	17	22	8		
	571.71	552.27	535.81	0.48	0.62
	75.69	102.11	78.67		
9. Wildlife management	16	22	7		
	506.53	486.51	488.22	0.27	0.77
	84.74	96.98	42.58		
10. Agricultural marketing	18	23	8		
	611.20	623.55	680.37	2.47	0.09
	72.05	76.53	74.06		

*Significant beyond the 0.05 level.

CONCLUSIONS

The interrelationships and interdependence of the agribusinesses were reflected in the uniformity in their use of information dissemination strategies. "Farm visits" and "meetings" were highly used by all. Agribusinesses used a wide variety of strategies rather than focusing on a few.

Agribusinesses reported the extent of their cooperation with other educational groups in Iowa as seldom. This rating was in contrast with the high extent of agribusiness educational cooperation reported by others (Pascalar, 1986; and Bowen, 1986).

Agribusinesses in this study were uniform in their support of supplying up-to-date information to agriculture teachers. The program topics, "Marketing" and "New skills for new careers," were rated highly by all three types of agribusinesses. "Diversification of agriculture" was supported more strongly by chemical/fertilizer agribusinesses than by seed agribusinesses.

RECOMMENDATIONS

Implications of these findings include:

1. Agri-educators need to look at the information dessemination strategies used by agribusinesses and determine what has made them effective. Educators should consider widening their use of educational strategies.

2. Agri-educators in Iowa need to improve their relationships with agribusinesses. Involving agribusiness representatives in planning programs and school curricula would ensure the incorporation of industry ideas and materials into agricultural instruction. Education/agribusiness cooperation would help in preparing students for profitable career positions in the agribusiness industry.

3. Agri-educators need to restate their objectives to match the present agricultural situation. They need to redirect their goals toward marketing of farm products, new agricultural careers and diversification of agriculture.

SUGGESTIONS FOR FURTHER RESEARCH

Further research is needed to:

1. Determine how to inculcate agribusiness ideas into agricultural education.

2. Determine the specific subject areas that will help students secure jobs in the agribusiness arena.

3. Determine the willingness of the agribusiness industry to support the advanced education of potential agri-educators.

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EDUCATIONAL STRATEGIES AND EXTENT OF COOPERATION WITH AGRI-EDUCATION BY SELECTED BUSINESSES
A Critique

Larry E. Miller, The Ohio State University -- Discussant

Garnering the cooperation of agribusinesses is highly important to agricultural education. Agribusinesses often are of assistance as they permit the exchange of people for education: teachers, students, and personnel; the exchange of non-people: materials, supplies, equipment; and provide financial support. Additionally, they provide much support to the teachers and programs through their advice giving. As many have noted, the agricultural educator is often remiss for not seeking-out the assistance of numerous community resources. We often think of agribusiness providing training stations for students on placement of cooperative education programs, but it can be much broader than that.

Some of the questions I have about this study are:

How was the sample size determined? Why was 15% selected? What level of confidence did this provide? Was sampling error effectively controlled?

What was the target population? Do "manufacturers" equal "agribusinesses?" As a former vocational agriculture teacher, many of what I perceived to be agribusinesses did not actually manufacture anything.

Is the list really educational activities or advertising, or marketing, or sales activities? Later, the tables say information dissemination. I think the study needs more precise constitutive and operational definitions of the characteristics under investigation.

What was the reliability of the measurement? Would the respondents reply the same way tomorrow, next week? What was the stability of the respondents? Test-retest reliability would have been appropriate.

How were the means checked to control non-response error?

Why was the alpha level set at .05, but the tables report .01?

Were the quotations from Bowen and Pascalar really things they "found" from a study or the expression of an opinion?

Did Table 3 confound "needs" with "supplying up-to-date information?" Do the authors believe that the authors were addressing agriculture teachers, students, or programs with their responses?

Under recommendations, the authors address the effectiveness of dissemination strategies, but do we really know if they are. I find the statement "Educators should consider widening their use of educational strategies." to be unclear and vague. What does this mean? In #2, the authors state that we need to improve our relationships, which may be true, but relationships did not appear to be studied. Does "involving" really equal "ensure?" They are on many advisory councils now, but do we really get ideas and materials? Will it really prepare students for "profitable careers" as the low pay seems to be one of the major issues for the profession to address. I do not understand, in #3, what the restatement of objectives to the agricultural situation implies. It seems to be rhetoric that needs greater specificity.

EFFECTIVENESS OF TWO INSTRUCIONAL MODES FOR TEACHING VOCATIONAL AGRICULTURE STUDENTS OF DIFFERING LEARNING STYLES

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INTRODUCTION

Teaching methods, strategies and techniques should be varied to reflect the different ways that individual students acquire knowledge and skill (Keefe, 1979). Although one mode of teaching may not be superior to another teaching mode when class averages are examined, students with different aptitudes may very well perform differently, depending on which teaching mode is used (Cronbach and Snow, 1977). Many educators and researchers have addressed the importance of individualizing materials for students to have the maximum learning benefit.

In the past decade two efforts have been launched by educators to provide more individualized instruction: (1) computer-assisted instruction and (2) understanding and assessing students' learning styles. Neither of these two efforts is particularly new, but they have come into vogue because of the inexpensive availability of microcomputers to the general public and the increased research that identifies learning styles as contributing to students' aquisition of knowledge.

Zahniser, Long and Nasman (1983) reviewed the literature and obtained experts' field-based opinions before releasing their publication, Microcomputers In Vocational Education: A Decision Guide. They found that both the experts and the reveiw of literature reflected serious concern about the educational effectiveness of computer-assisted instruction. Few studies have been conducted to examine the microcomputers effectiveness at teaching psycho-motor skills. And furthermore, studies that have examined and evaluated the effectiveness of microcomputers and their accompanying software have used teachers, college students or academic high school students as the research subjects rather than vocational high school students.

Numerous learning style indicators have been developed and validated to assess various aspects about how individuals learn. A review of the learning style movement shows that the majority of the research on personality-related learning variables has been in the area of cognitive style and that is the style that can be most easily assessed (Friedman and Alley, 1984). Most of the cognitive learning style indicators, however, are not valid or reliable when administered to individuals other than adults. Witkin, Oltman, Raskin and Karp (1971) developed the Group Embedded Figures Test (GEFT), as a perceptual test to determine the extent which a person perceives analytically. The GEFT has been validated on individuals age five and over. Scores at one extreme of the GEFT's performance range indicates that individuals' perceptions are strongly dominated by the prevailing field (field-dependent) and scores at the other extreme of the test's performance range indicates that those individuals identify items separate from the surrounding field (field-independent).

Beyond knowing what learning styles students possess, few studies (Hauck, 1985) have examined how different teaching methods, strategies or techniques interact with student learning styles to influence the extent to which students learn.

PURPOSES AND OBJECTIVES

The purpose of this controlled teaching experiment was to assess whether ninth grade vocational agriculture students' learning styles influenced the effectiveness of two modes of teaching the use of the micrometer. The two levels of the independent variable, mode of teaching, were a lecture-discussion presentation taught by the researcher and a microcomputer-assisted instructional software program written for use with the Apple II series of microcomputers. Students' preferred learning style, field-dependent or field-independent, was used as the major moderator variable to examine how it modified the relationship of the major independent variable, mode of instruction, on the outcome measure, students' scores on a micrometer performance and written exam. A subsidiary purpose was to examine differences in students' learning style with regard to age, sex, agricultural background, previous microcomputer experience, vocational agriculture grade and class rank in school.

PROCEDURES

The population for this posttest-only control-group design consisted of all ninth grade vocational agriculture students enrolled in three central Pennsylvania counties. One hundred seventy three students comprised a census of the population and were initially involved in the experiment. Data from 137 students were included in the final data analysis. Data from 36 subjects were not used because some of the students (18) were not present for the administration of the GEFT; some students (15) had prior micrometer experience; and some of the study's subjects (3) were advanced beyond the ninth grade.

Students were randomly assigned to one of two treatment groups, a microcomputer-assisted instruction section or a lecture-discussion instruction section, without regard to their learning style or demographic characteristics. A 30-minute lesson regarding the use of the micrometer was presented to the subjects.

A pool of written and performance test questions related to the micrometer was developed by the researcher and validated for face and content validity by a panel of experts in agricultural education and agricultural engineering. A pool of 36 test questions was administered to 48 ninth grade vocational agriculture students who were not among the 173 research subjects. The exam was subjected to the Kuder Richardson 20 (KR-20) test for reliability and yielded a reliability coefficient of .90. The twenty test items showing the highest individual reliability coefficients were chosen to be administered as a posttest following the instructional lesson; eight of the test items were performance based requiring psycho-motor skills and the remaining twelve test items were written questions requiring cognitive knowledge. The 20-item posttest was administered immediately following the lesson. The Group Embedded Figures Test (GEFT) was completed by the subjects to determine their learning style preference, field-dependent or field-independent.

The researcher prepared and taught the lesson using the lecture-discussion teaching technique with demonstrations and a student handout. Each student had the individual use of a micrometer. The researcher's lecture-discussion lesson and instructional handout were developed from agricultural engineering materials and texts used to develop the posttest items.

The micrometer lesson, delivered using a microcomputer, was developed by Fish (1980). During the microcomputer delivered lesson, each student had the use of an individual microcomputer, a micrometer and the same instructional handout used by the students in the lecture-discussion group. A proctor was present to assist the students in using the microcomputer if necessary but the proctor did not provide any teacher/student interaction regarding the micrometer lesson.

ANALYSIS OF DATA

A 2 x 2 factorial design was used for data analysis where the independent variable and the moderator variables represented nominal data and the dependent variable represented interval data. The significant differences and answers to the study's research questions were decided by calculating the basic descriptive statistics.

Considering that the population was a census of all the subjects available, any differences in subjects' demographic characteristics, with regard to their learning style, and their test scores would constitute a significant difference. However, the researcher wanted the statistical differences to be large enough that readers could distinguish obvious differences in the findings. The researcher set the following criteria as constituting significant differences for the purposes of this study and refers to such differences as practical differences. Difference with regard to students' learning style preference was set at the 20 percent criterion level because that would be sufficient to denote noticeable numbers of students. The practical difference of 10 percent was chosen for the exam scores because a 10 percent difference in scores is customarily used by teachers to denote a letter grade difference.

RESULTS

The GEFT has a theoretical range of scores from 0 to 18. The mean for the 137 subjects in the study was 6.03. The subjects whose scores were above the mean (6.04 to 18) were classified as having a preference for a field-independent learning style, and those below the mean (0 to 6.03) were designated as having a field-dependent learning style preference. Eighty three students were classified as field-dependent learners and 54 students were classified as field-independent learners.

Table 1 denotes the differences in mean test scores that the students tallied on the posttest. Three separate exam scores are exhibited: (1) the 12-item written exam score, (2) the 8-item performance exam component and (3) the 20-item total exam score. Composite scores for the microcomputer section and the lecture-discussion section are also shown.

When considering the effects of the two treatment groups, microcomputer section and lecture-discussion section, students who were in the lecture-discussion section scored higher on the two exam components as well as their total score (12.1 versus 11.2) for the total examination. These differences, however, were less than the ten percent the researcher had set as constituting a practical difference.

Field-independent learners taught in the lecture-discussion section scored higher ($\bar{X}$ = 6.1, 76%) on the performance component of the examination than did the field-independent students taught in the microcomputer section ($\bar{X}$ = 5.0, 63%). For the total exam, field-independent students taught in the lecture-discussion section scored higher ($\bar{X}$ = 14.4, 72%) than did field-independent students in the microcomputer section ($\bar{X}$ = 12.4, 62%).

Figure 1 illustrates the differences in the ninth grade vocational agricultural students' learning style preference with regard to age, sex, agricultural background, previous microcomputer experience, grade in vocational agriculture and class rank in school. By examining the figure, it is determined that more students, in general, preferred a field-dependent learning style in every biological and experiential category except three: (1) those who had microcomputer experiences in and out of school, (2) those who were "A" students in vocational agriculture and (3) those who ranked in the upper 1/3 of their class.

CONCLUSIONS AND RECOMMENDATIONS

When considering all of the subjects, without regard to their individual learning style, there were no significant differences between the effect of microcomputer-assisted instruction and the lecture-discussion technique of delivering instruction to high school students.

Table 1

Students' Examination Scores by Treatment Group by Learning Style Preference

N = 137

Method of Presentation by Learning Style		Written Exam Component		Performance Exam Component		Total Exam Score	
	N	$\bar{X}$	s.d. Range	$\bar{X}$	s.d Range	$\bar{X}$	s.d. Range
Microcomputer Section (X_1)							
Field-Dependent Learner	(40)	6.3	2.3 (1-10)	4.0	2.1 (0-7)	10.3	3.6 (4-17)
Field-Independent Learner	(31)	7.4	2.5 (3-12)	5.0	1.7 (1-8)	12.4	3.4 (6-20)
Microcomputer Composite	(71)	6.8	2.4 (1-12)	4.4	2.0 (0-8)	11.2	3.7 (4-20)
Lecture-Discussion Section (X_2)							
Field-Dependent Learner	(43)	6.7	2.4 (1-11)	4.1	2.0 (0-8)	10.8	3.9 (3-18)
Field-Independent Learner	(23)	8.3	2.0 (4-11)	6.1	1.6 (1-8)	14.4	3.0 (6-19)
Lecture-Discussion Composite	(66)	7.2	2.4 (1-11)	4.8	2.1 (0-8)	12.1	3.4 (3-19)

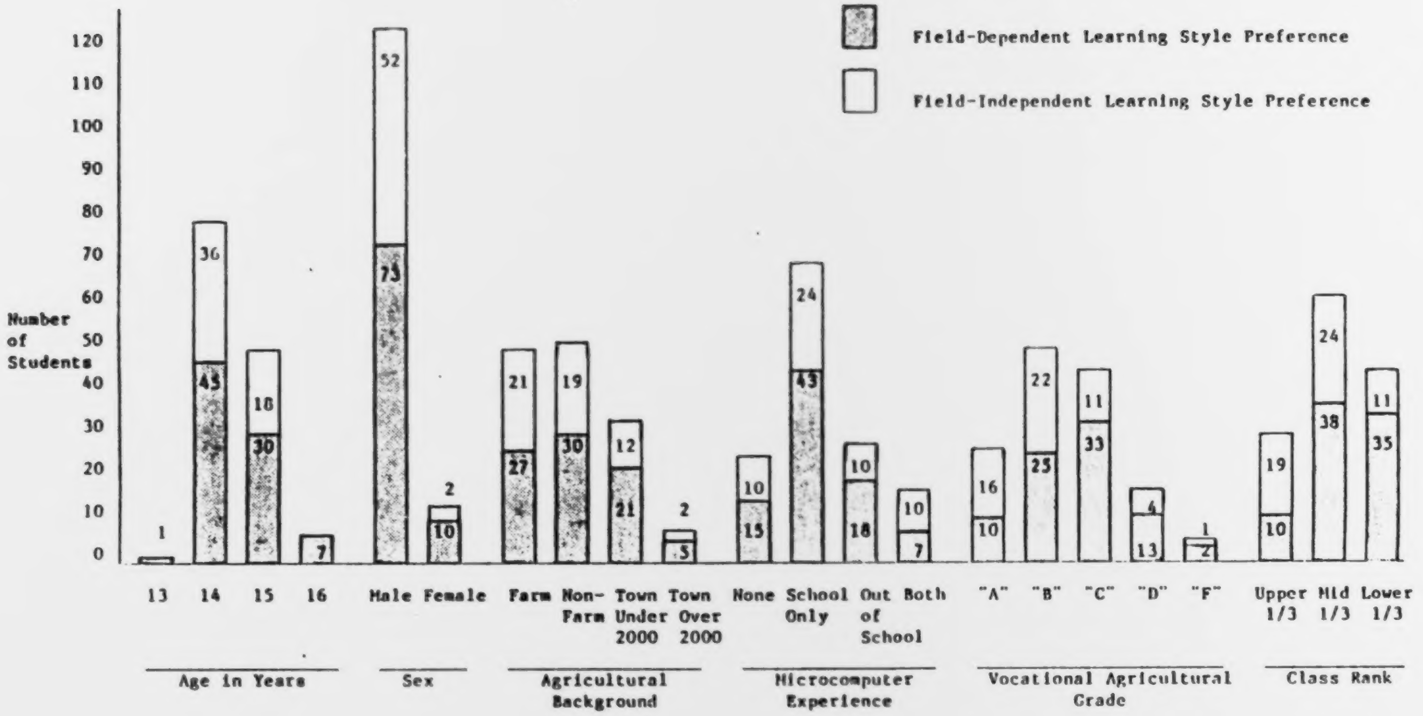

Figure 1: Frequencies of Learning Style Preference for Ninth Grade Vocational Agriculture Students with Regard to Age, Sex, Agricultural Background, Vocational Agriculture Grade and Class Rank

There were no practical differences, 20 percent or more, between the students' age, agricultural background, or previous microcomputer experience when considering the students' preferred learning style. Though there were a small number of females in the study, 12 as compared to 125 males, a greater proportion of females (83%) were field-dependent learners as compared to males (58%). With regard to student achievement and learning style preference, a greater proportion of students earning "A" and "B" grades in vocational agriculture (52%) were field-independent learners as compared to students earning "C", "D", and "F" grades (25%). Similarly, a greater proportion of students ranking in the upper one-third of their class (66%) were classified as field-independent learners as compared to those ranking in the middle (40%) and lower one-third of their class (24%).

Ninth grade, field-independent vocational agriculture students, in the lecture-discussion section, scored significantly higher on the posttest's performance component score and total test score than the field-independent learners in the microcomputer assisted section and the field-dependent learners in either section.

Research regarding individual learning styles and their interaction with teaching methods, strategies and techniques should be continued. The investigator of this research believes that evidence is presented which supports the fact that vocational agriculture students' learning style should be assessed. Teaching techniques that best meet the needs of individuals can then be employed.

This research indicates that field-independent learners, it would appear, can make more improvements in their scholastic knowledge if they have teacher interaction during their instruction. Field-dependent learners, on the other hand, appear to have no added scholastic benefit by being instructed via a teacher or a microcomputer. Field-dependent learners, if in fact they are lower academic achievers, can be remediated and provided instruction at their own pace via microcomputer programs (the very things for which microcomputers have their greatest acclaim).

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EFFECTIVENESS OF TWO INSTRUCTIONAL MODES FOR TEACHING VOCATIONAL AGRICULTURE STUDENTS OF DIFFERING LEARNING STYLES

A Critique

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Howard and Yoder have begun what I hope is a journey, not a one-time trip. If the profession is to make use of constructs such as psychological differentiation, then it will most certainly have to have additional help from Drs. Howard and Yoder and others. If this is an isolated dabbling in this stream of psychological science, then it will be of limited value. Let's hope this is not the case.

The paper is generally clear and well written. The technical aspects of design were fine and the portrayal of data was crisp. The purposes and objectives section was written especially well.

Their work is based on that of specialists within psychology which is a must for this topic. They went beyond the simplistic view of examining a single phenomenon and built in a second appropriate variable of considerable interest.

For this audience the paper needs to do a better job of building the connection between GEFT scores and the problem being investigated. Share with the reader the logic for expecting a connection between the variables of interest and what the connection is likely to be. If the hunch which is postulated emerges, explain what it means for us?

It was not enough for me to know that there was a thirty minute lesson with lecture-discussion, a handout, and the use of a micrometer. I need to know how the science of teaching and learning was brought to bear on this instructional task?

In addition, I need to know to what extent the structure of knowledge was similar between the two levels of the treatment. Was the content, the sequence, and the clarity of the knowledge in the lecture-discussion and the microcomputer version comparable?

When seeking to impact on learning, one can almost always be sure that thirty minutes will not do the job. Furthermore, given the psychological property being examined, should one expect thirty minutes to be sufficient?

Another concern is experimenter bias. Given that the investigator designed and delivered one level of the treatment, there should have been some evidence that his bias did not have an opportunity to influence the outcome of the study.

The majority of students were field dependent. Explain for the reader what this should mean as related to preferred way of learning and as related to mode of teaching. Be willing to make it clear to the reader whether you believe, for example, learning via micro-computer instruction is more field dependent in nature, allowing the learner to submit passively or if it is something else.

In the final three paragraphs the authors summarize things nicely. Again, there needs to be greater clarity regarding how psychological differentiation and mode of teaching fit in theory as well as in practice.

The authors are operating in a vein of inquiry that is stimulating and useful. For the good of the profession, let's hope they will continue to pursue this area of interest and share their results with us for years to come.

EFFECT OF FEEDBACK ON TEACHING BEHAVIOR OF AGRICULTURAL TEACHER EDUCATORS

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Teacher educators in agriculture are generally required to perform in three areas - teaching, research and service. Is it too much to ask teacher educators to function in all three areas? Obviously, based on the standard practice in the profession, the answer is no.

Depending on the amount of time allocated to each area, the teacher educator may feel like a juggler who is assigned the task of juggling a bowling ball, a softball and a golf ball. With words like promotion and tenure hanging in the balance, the teacher educator may place more emphasis on one area over the others, depending upon the guidelines that have been established for promotion and tenure by his or her university.

Faculty who are concerned with their teaching effectiveness are sometimes overlooked in the publish or perish climate. "Since national prestige in an academic discipline is usually gained by research and publication, a faculty member (especially one who devotes himself to undergraduates) must look to his own institution for recognition and rewards for teaching efforts" (Gaff and Wilson, 1971).

Numerous researchers have investigated the relationship of teacher feedback to student achievement. Most of these studies have shown that teacher feedback has a positive effect on student achievement. Studies have also been conducted to investigate teacher effectiveness and research productivity at the university level, but few studies have attempted to measure or quantify any specific type of teacher behaviors (Rosenshine, 1976).

Aspy and Roebuck (1974) measured the correlation between the human characteristics of a teacher and student achievement. They found that "The most effective trainers of teachers were those who exhibited the facilitative conditions (empathy, congruence and positive reward) at their highest level" (p. 169).

Rosenshine and Furst (1973) reviewed over 50 studies that examined the relationship between teaching behavior and student achievement. They identified nine teaching behaviors that had the most significant correlations with student learning. In an earlier article, Rosenshine and Furst (1971) had warned teacher educators that some education experts were building teacher education programs on opinions rather than on teacher behavior research.

Student evaluations, particularly at the university level, have been shown by research to be an effective way to provide teachers with a source of feedback (Marsh, Fleiner, and Thomas, 1975). Good (1983) stated that most researchers have overlooked the concept of teacher behavior, as viewed by the students, as having an impact on achievement.

No research could be found that attempted to determine the impact of student feedback on the teaching behavior of agricultural teacher educators. This study was based on the concept that the teaching behavior of agricultural teacher educators is measurable and that two valid sources of measurement information are agricultural teacher educators and their students.

PURPOSE AND OBJECTIVES

This study was conducted to determine the impact of student feedback upon the teaching behavior of agricultural teacher educators (as measured by the Tuckman Teacher Feedback Form (Tuckman, 1976)). The study also investigated the relationship between research productivity and teaching behavior. The research questions for the study were:

1. Do teacher educators who receive feedback about their teaching behavior change their perceptions of their teaching behavior?
2. Do teacher educators change their teaching behavior after receiving feedback as shown by a change in the students' perceptions of teaching behavior?
3. Do student perceptions of the teaching behavior of teacher educators that receive feedback differ from the student perceptions of teacher educators who do not receive feedback?
4. Is there a relationship between research productivity and a) self-perceptions of the teacher educators about their teaching behavior, and b) students' perceptions of the teaching behavior of teacher educators?
5. Is there a difference among the three academic ranks on a) self-perceptions of the teacher educators about their teaching behavior, and b) students' perceptions of the teaching behavior of teacher educators?
6. Is there a difference in the students' perceptions of the teaching behavior of agricultural teacher educators by selected student variables (sex, grade level, major/minor in agricultural education versus non-majors/minors, and elective versus required course status.

PROCEDURES

An experimental pretest posttest control group design (Campbell and Stanley, 1963) was selected because this design is not subject to the internal validity threats described by Campbell and Stanley. The main instrument was a modified version of the form developed by Tuckman (1976) entitled "The Tuckman Teacher Feedback Form (TTFF, copyright 1971). The form was modified, with the author's permission, because the field test indicated that two terms could lead to misinterpretation by the students.

The TTFF is a seven point, 28 item semantic differential form that generates four dimensions related to teacher behavior - creativity, organized demeanor, dynamism, and warmth and acceptance. The form was selected because it is short and efficient and can be expected to be more objective than self-report instruments. Reliability coefficients were calculated using Cronbach's Alpha. The estimates on the four subscales for teacher educators and students were: creativity - r = .84 and .73, dynamism - r = .87 and .75, organized demeanor - r = .80 and .70, and warmth and acceptance - r = .84 and .84.

A demographic information form was also used to gather information needed for the study, including a list of all books and book chapters that the teacher educators had written. A computer search was used to find the articles that each teacher educator had published in the *Journal of the American Association of Teacher Educators in Agriculture*, the *Journal of Vocational Education Research*, the *Agricultural Education Magazine*, and *VocEd, The Journal of the American Vocational Association*. National Agricultural Education Research Meeting papers were found by reviewing past NAERM programs. This information was used to calculate a research productivity score for each teacher educator. The relative point value for each of the five variables was derived from Stalling and Singhal (1970) and the consensus of a panel of 4 agricultural teacher educators. The point values were based on a five year period from 1979 thru 1983. The point values by source are presented in Table 1.

The population of agricultural teacher educators, as listed in the Directory of Agricultural Teacher Educators (Rogers, 1984), was used for the study. Three agricultural teacher educators reviewed the directory for accuracy, eliminated those teacher educators whose primary assignment was not in agricultural education and added those who were not listed and whose assignment was in agricultural education. Only professorial rank (assistant, associate, full) faculty members who taught at least one class, undergraduate or graduate, that met on a regularly scheduled basis for the entire spring semester or spring quarter, 1984, were included. This resulted in 97 teacher educators and 949 students being selected (69 on semester system, 27 on quarter system).

The teacher educators were divided by rank and then randomly assigned to groups (feedback or no feedback). Both the teacher educators and their students (in a class randomly selected by the researcher) filled out the TTFF at the first of the quarter or semester. In addition, the teacher educators filled out a demographic information form. The teacher educators in the treatment group were given feedback (explanation of the four dimensions of teaching behavior along with their own perceptions and their students' perceptions as measured by the TTFF) two weeks after the start of the semester or quarter. Then the teacher educators and their students filled out the TTFF at the end of the semester. Phone follow-ups were used for non-respondents.

Seventy-five out of 97 teacher educators (77%) and their 760 students (80%) agreed to participate. Thirteen of the 22 non-respondents agreed to complete the TTFF and it was found that they were significantly different from the respondents on two of the four dimensions (creativity and dynamism).

Mortality was defined as those 13 agricultural teacher educators and their students who participated in the initial assessment but did not participate on the final assessment. The responses on the initial assessment of the teachers and students in the mortality group were compared to the responses of the 62 teacher educators and their students who completed both the initial and final assessments. There were no differences between the responses of the respondent and mortality groups of teacher educators about their self-perceptions of their teaching behavior. On the student responses, the mean student perception for the dimension of creativity for the mortality group was higher than the mean student perception of the respondent group.

The alpha level was set at .05. The data were analyzed using descriptive statistics, Spearman rho correlation coefficients, and multivariate analysis of variance (MANOVA). Least square means were used instead of raw means in the MANOVA because an unbalanced design was used in this study.

RESULTS

Research Question 1 Table 2 displays the agricultural teacher educators' self-perceived teaching behavior by group. The results of the MANOVA indicated that no differences existed in the group that received feedback between the initial and final assessments of the agricultural teacher educators' self-perceptions (F (4,53) = .025, P F = .9067).

The orthogonal contrasts of the agricultural teacher educators' self-perceptions in the feedback group are presented in Table 3. No differences were found between the initial and final assessments of the agricultural teacher educators' perceptions in the feedback group on any of the four dimensions.

Research Question 2 Table 4 displays the students' perceptions of the teaching behavior of agricultural teacher educators who received feedback. The results of the MANOVA indicated that no differences existed in the group that received feedback between the initial and final assessments of the agricultural teacher educators' self-perceptions (F (4,53) = .42, P F = .7940).

The orthogonal contrasts of the students perceptions in the feedback group are presented in Table 5. No differences were found between the initial and final assessments of the agricultural teacher educators' perceptions in the feedback group on any of the four dimensions.

Research Question 3 Table 6 displays the students' perceptions of the teaching behavior of agricultural teacher educators who received feedback versus the perceptions of teacher educators who did not receive feedback. The results of the MANOVA indicated that no differences existed in the group that received feedback between the initial and final assessments of the agricultural teacher educators' self-perceptions (F (4,53) = .42, P F = .7940).

The orthogonal contrasts of the students perceptions are presented in Table 7. No differences were found between the students' final assessments for the treatment and control groups on any of the four dimensions.

Research Question 4 The mean research productivity score for the 62 teacher educators who participated in all phases of the project was 7.44 (SD=8.21). The Spearman correlation coefficients for the relationships of self-perceptions and students' perceptions to research productivity scores revealed that no significant relationships existed for any of the four dimensions (Table 8).

Research Question 5 MANOVA was used to determine if the teacher educators' self-perceptions and students' perceptions differed according to academic rank. No differences were found for the teacher educators' self perceptions (F (8,106) = .61, P F = .7700) or for the students' perceptions (F (8,106) = 1.51, P F = .1618) according to academic rank. The least square means are presented in Table 9.

Research Question 6 MANOVA was used to determine if differences existed in the students' initial assessment according to sex, grade classification, major/minor or non-major/minor in agricultural education, and elective vs. required course. All four analyses resulted in significant F values as follows:

Sex: F (4,773) = 4.15, P F = .0025
Graduate vs undergraduate: F (4,773) = 3.44, P F = .0084
Major/minor vs non-major/minor: F (4,773) = 4.78, P F = .008
Elective vs required course: F (4,773) = 6.16, P F = .0001

The tables containing the univariate F values and the least squares means have been omitted from this paper because of the eight page limit on paper length.

CONCLUSIONS

These conclusions are limited to the respondents because of the differences cited in the procedures section of this paper:

1. Teacher educators who received feedback did not change their self-perceptions of their teaching behavior between the initial and final assessments.
2. Students perceptions of the teaching behavior of teacher educators who received feedback did not change between the initial and final assessments.
3. Feedback to the teacher educators did not change the students' perceptions.
4. Research productivity and the teaching behavior of agricultural

teacher educators (as perceived by themselves and their students) were not related.

5. Academic rank of the teacher educator was not related to their individual or their students' perceptions of their teaching behavior.

6. Female students and graduate students were more likely to rank teacher educators higher than male students and undergraduate on the dimension of organized demeanor.

7. Major and/or minor students in agricultural education were more likely to rank agricultural teacher educators higher than non majors and/or minors on the dimension of warmth and acceptance.

8. Students required to take the course were significantly more likely to rank teacher educators lower than students taking the course for an elective on the dimension of creativity.

RECOMMENDATIONS

1. Additional research should be conducted to determine what types and sources of feedback have an effect on the teaching behavior of agricultural teacher educators.

2. The variables associated with the dimensions of the TTFF were not significantly correlated with research productivity. Since research productivity is valued in higher education settings, correlates of research productivity need to be identified through future research.

3. Future studies should attempt to identify alternative instruments to measure teacher behavior.

4. Stronger evaluation feedback procedures needs to be developed. Levinson-Rose and Menges (1981) suggest that some feedback procedures are more effective in producing faculty change than others.

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Table 1: Point Values Assigned to Research Productivity

Source	Single author	Co-authored	3 or more authors
Books	9.0	4.5	3.00
Chapters in books	2.0	1.0	0.67
Articles (refereed)	3.0	1.5	1.00
Articles (non-refereed)	2.0	1.0	0.67
Papers (NAERM)	3.0	1.5	1.00

Table 2: Agricultural Teacher Educators' Self-Perceptions of Teaching Behavior

Group	Time	n	Creativity	Dynamism	Organized demeanor	Warmth and acceptance
No feedback	Initial	33	27.52	27.45	35.00	34.85
	Final	33	28.58	28.33	34.21	34.45
Feedback	Initial	29	28.21	28.83	34.72	33.90
	Final	29	29.28	28.66	34.21	33.76

Table 3: Orthogonal Contrasts of the Agricultural Teacher Educators' Self-Perceptions

Dimension	df	F value	P
Creativity	1	1.47	.2304
Dynamism	1	0.12	.7317
Organized demeanor	1	1.38	.2455
Warmth and acceptance	1	0.08	.7720

Table 4: Students' Perceptions of Teaching Behavior

Group	Time	n	Creativity	Dynamism	Organized demeanor	Warmth and acceptance
No	Initial	33	26.36	27.06	33.80	34.90
feedback	Final	33	27.21	27.52	33.69	35.36
Feedback	Initial	29	27.08	28.55	33.66	34.39
	Final	29	27.18	28.58	32.69	33.96

Table 5: Orthogonal Contrasts of the Students' Perceptions of the Teaching Behavior of Agricultural Teacher Educators

Dimension	df	F value	P F
Creativity	1	0.05	.8209
Dynamism	1	0.04	.8370
Organized demeanor	1	3.41	.0700
Warmth and acceptance	1	0.93	.3402

Table 6: Least Square Means of the Students' Final Assessment of Teaching Behavior

	Least squares means (LSM)	
Dimension	Feedback	No feedback
Creativity	27.04	26.68
Dynamism	28.58	27.16
Organized demeanor	33.17	33.47
Warmth and acceptance	34.44	35.15

Table 7: Orthogonal Contrasts of the Students' Final Assessment Perceptions of the Teaching Behavior of Agricultural Teacher Educators: Feedback vs. No Feedback

Dimension	df	F value	P F
Creativity	1	0.00	.9632
Dynamism	1	0.92	.3402
Organized demeanor	1	0.69	.4063
Warmth and acceptance	1	1.20	.2759

Table 8: Relationship of Agricultural Teacher Educators' Self-Perceptions and Students' Perceptions to Research Productivity Scores (n=62)

Dimension	Spearman rho	P
Agricultural Teacher Educators		
Creativity	-.2466	.0533
Dynamism	-.0065	.9600
Organized demeanor	.1812	.1587
Warmth and acceptance	-.0930	.4720
Students		
Creativity	.0434	.7379
Dynamism	-.0226	.8618
Organized demeanor	.2007	.1178
Warmth and acceptance	.0206	.8735

Table 9: Least Squares Analysis of Teacher Educators' Self Perceptions and Students' Perceptions According to Academic Rank of Teacher Educator

	Academic rank		
Dimension	Assistant professor LSM	Associate professor LSM	Professor LSM
Agricultural Teacher Educators			
Creativity	29.48	28.13	27.80
Dynamism	28.94	27.68	28.59
Organized demeanor	34.37	34.21	34.95
Warmth and acceptance	35.83	34.19	33.32
Students			
Creativity	26.75	26.75	27.07
Dynamism	28.02	27.16	28.42
Organized demeanor	33.37	32.64	33.96
Warmth and acceptance	35.93	34.68	33.79

EFFECT OF FEEDBACK ON TEACHING BEHAVIOR
OF AGRICULTURAL TEACHER EDUCATORS
A Critique

Philip Buriak, Mississippi State University -- Discussant

Feedback effects behavior. This was the premise upon which the investigation was based. The researchers stated, "Numerous studies have documented the relationship of teacher feedback to student achievement", but cited none from education or psychology. Rather, research related to teacher behaviors was provided as rationale. An expanded review would have yielded sound psychological theory upon which to build an excellant investigation of a very commendable topic.

As stated, the purpose of the investigation was to determine the impact of student feedback on teaching behavior. Objectives 1,2,and 3, addressed this purpose. I find no basis for the inclusion of the relational study of research productivity (objective 4), and student and teacher demographics (objectives 5 and 6). No rationale was provided for their inclusion, nor did their analysis provide information directed to the identified purpose.

The design was appropriate. The instrument used for observations and treatment may not have been appropriate. The Tuckman Teacher Feedback Form (TTFF) was designed as a rating form, not an after the fact survey questionnaire for student and self-evaluation. I question its selection when Tuckman reported inter-rater reliabilities of the four dimensions ranging from 0.77 to 0.22. Again, an expanded review of literature may have provided a better measurement from which to provide the treatment, feedback.

With regard to treatment, I have concerns. Does the review of one set of feedback comprise sufficient exposure to the treatment? Will treatment effects decay when measurement occurs approximately 10 weeks later? And lastly, were any efforts made to determine if teachers actually read and used the feedback provided? With these questions unanswered, little confidence can be held in the results of the study.

The study was described as a population study, yet, only those in the population agreeing to participate were studied. I assume inferential statistics were used under the assumption that the observed population represents a sample in time, otherwise, the 1983-84 data may not be appropriate for presentation at the end of 1987.

Data were analysed using descriptive statistics, Spearman rho correlations, and MANOVA. Least squares analyses were appropriately used due to differential n's. However, analyses required to satisfy the objectives as reported, showed no evidence of a need for MANOVA over ANOVA. Research questions 1, 2, and 3 (Should these have been stated as hypotheses?), found no significant differences for all comparisons. Why then was a multivariate post hoc analysis conducted? Orthogonal contrasts were not needed. All dimensions of the TTFF correlate with pedagogic competency (Tuckman). This implies the dimensions were not independent, therefore, the contrasts were not only unnecessary, they may have been inappropriate. Spearman rho assumes linearity. Is research productivity linear? My assumption is that productivity is curvilinear, a function of years in the profession.

The researchers are to be commended for the identification of a problem that could lead to the establishment of a basis for understanding feedback and behavior. With more attention to theory, selection of a more appropriate instrument, a verifiable treatment of appropriate duration, and a modification of the statistical analyses, the scientific basis for teaching could be strengthened.

EMPLOYERS' PERCEPTIONS OF TECHNICAL AND NON-TECHNICAL SKILLS NEEDED BY HORTICULTURAL EMPLOYEES

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INTRODUCTION

Postsecondary two year institutions have been part of the American educational system since the beginning of the 20th century. Social forces, such as the need for trained workers in the nation's growing industries and the American drive for social equality, were pertinent factors in the establishment of postsecondary two year institutions (Cohen & Brawer, 1982).

Currently there are 1,222 postsecondary two year institutions in the United States (American Association of Community and Junior Colleges, AACJC, 1986). The AACJC (1986) cited postsecondary two year institutions in the United States as having enrollment in excess of 9,500,000 students. These institutions have become a vital part of the American educational system. Fifty percent of the respondents in a study on American attitudes toward higher education choose postsecondary two year institutions as a means to begin or continue their college education (AACJC, 1984).

One of the most important goals of postsecondary two year institutions is to educate and train students for the attainment of their career goals as well as the needs of society and business. Maintaining close linkages with industry is essential for ensuring that students receive an education that will properly prepare them for the work force (Ladislav, 1985). Postsecondary two year institutions must ask if programs offered are meeting existing needs of students and industry (Garrity, 1984).

In a needs assessment study by Murphy and Jenks (1982), employers identified non-technical skills as being either necessary or desirable for obtaining employment. In a recent study, agriculture instructors and business people identified communication skills as the most important skills for employment (Weiner, 1984).

PURPOSE AND OBJECTIVES

If the education provided by postsecondary two year institutions is to prepare students for positions in the work force, specific technical and non-technical skills must be included in the curriculum. Postsecondary two year institutions need to include technical and non-technical skills in the curriculum (Garrity, 1984).

The purpose of this study was to determine employers' perceptions of the importance of technical and non-technical skills needed by horticultural employees. The specific objectives of the study were:

1. to determine employers' perceptions of the importance of non-technical skills as compared to technical skills for persons working in the horticultural industry.
2. to determine if differences exist among the types of horticultural businesses on perceptions of non-technical skills as compared to technical skills for persons working in horticultural businesses.

The following terms were operationally defined based on their use in this study: a) **non-technical** skills include reading, writing, speaking, and listening and b) **technical skills** are skills directed specifically at a given technical competency; for example, planting, pruning, propogating and identifying plants.

PROCEDURES

The design for this study was descriptive survey. Horticultural industry members in Ohio were the target population for the study. The target population included those individuals, companies, and corporations involved in three basic areas of horticulture: landscape/nursery, lawn care/turfgrass and floriculture.

The frame for the study was developed by using the 1986 Ohio Turfgrass Foundation Directory, the 1986 Ohio Nurseryman's Association Yearbook and the 1986 Ohio Floriculture Association Directory. The directories were compared for any duplication of names. After duplications were eliminated, the three directories represented an accessible population of 953 horticultural industry members. Of the 953 horticultural industry members in the accessible population, 516 (54%) were classified as landscape/nursery, 275 (29%) were classified as lawn care/turfgrass, and 162 (17%) were classified as floriculture. A random sample of 275 industry members was chosen from the accessible population of horticulture industries. This sample consisted of 56% landscape/nursery, 27% lawn care/turfgrass, and 17% floriculture businesses. The sample was drawn using a computer-generated list of random numbers with replacement.

The survey instrument was designed by the investigator. Content validity was established by a panel of experts consisting of agricultural education faculty at The Ohio State University, administrators and faculty at the Agricultural Technical Institute in Wooster, and graduate students in agricultural education at The Ohio State University. A pilot test was conducted during the Ohio Nurseryman's Short Course in January 1987. The instrument was given to industry members, graduate students and faculty members who attended the short course. Information from the pilot test helped to modify the instrument in areas of readability, clarity and length. A reliability coefficient (KR-21) of $r = .74$ was calculated for the attitudinal scale used in Section I of the instrument.

The final instrument consisted of three sections. The first section was a series of 15 statements, designed by the investigator, comparing non-technical skills with technical skills. The statements were evaluated on a four point Likert type scale using strongly-agree (4) to strongly-disagree (1). The employers were asked to compare the skills needed for entry level employment in a horticultural occupation. Section two consisted of four open-ended questions. The questions required short responses regarding what industry members would add to postsecondary two year education, in what general areas new employees needed training, desired characteristics of management personnel, and characteristics expected from two year college graduates. Section three determined demographic data on the horticultural businesses. Information collected included the size and type of horticultural business, the number of year-round, full-time employees, the number of employees with postsecondary education, and the length each business had been in operation.

The instruments were mailed to specific employers at 275 horticultural businesses on February 17, 1987. A follow-up letter and instrument were mailed on March 24, 1987 to the horticultural businesses that had not responded. Of the 275 original instruments mailed, 119 were returned for a response rate of 43%. Respondents were compared to non-respondents by sectioning Ohio into four quadrants. A randomly selected sample of non-respondents from each quadrant was asked to complete the questionnaire by telephone. Of the 21 non-respondents contacted, eight chose to respond by answering the instrument. A Chi-square test for independence showed no statistical difference between the employers who originally responded to the questionnaire and those who did not on the variables of type of business, business structure, and number of year-round full-time employees. However, a statistical difference was present between the non-respondent and respondents on the number of years the business had been in operation. Non-respondents were in operation between 15 and 76 years. Respondents, however, ranged from three years in operation to 122 years in operation.

Descriptive statistics were used to describe horticultural industry members in Ohio and employers' perceptions of the importance of technical and non-technical skills in entry level horticulture jobs. The Chi-square statistic was used to determine the differences between respondents and non-respondents and to determine the differences among the categories of horticultural businesses on their perceptions of non-technical and technical skills. The data were analyzed using the SPSS/PC+ IBM computer program.

RESULTS

Findings presented include (a) a description of Ohio horticultural employers on selected demographic variables, and (b) Ohio horticultural employers' perceptions of the importance of non-technical skills (e.g., speaking, writing, listening, etc.) as compared to technical skills (e.g., plant identification, plant pest identification, planting, pruning, watering) for employees working in horticultural businesses.

Sample Demographics

Of the 119 horticultural employers who returned the questionnaire, 76 (64%) were classified as landscape/nursery, 23 (19%) were lawn care/turfgrass and 19 (16%) were floriculture businesses.

The average number of years the businesses had been in operation was 30. Two-thirds (66%) of the horticultural businesses surveyed have been in operation for less than 30 years. Forty-seven percent have been in operation for fewer than 10 years. Floriculture businesses had been in operation an average of 29 years, lawn care/turfgrass businesses for 27 years, and landscape/nursery businesses for 14 years.

Fifty percent of the horticultural businesses employed between one and five full-time, year-round employees. Seventy-two percent of the horticultural businesses had 10 or fewer full-time employees. Forty-eight percent of the horticultural businesses had employees with technical degrees from postsecondary two year institutions. Fifty-seven percent of the landscape/nursery classification employed graduates with associate degrees from postsecondary two year institutions. Thirty-seven percent of the lawn care/turfgrass businesses and 43% of the floriculture businesses employed workers with technical degrees.

Of the 119 respondents 39 (33%) were sole ownerships, 11 (9%) were classified as partnerships, 57 (48%) were incorporated and seven (6%) were other business types.

Importance of Technical and Non-technical Skills

Horticultural employers in Ohio were asked to respond to a series of statements regarding skills they perceived to be important for their employees. Table 1 shows the means, standard deviations, and percent agreement for the 15 statements comparing technical skills and non-technical skills. Sixty-one percent of horticulture employers felt that professionalism was best represented by the employee's technical horticulture knowledge. However, nearly two thirds (61%) of the employers perceived communication skills as more important for horticultural employees when compared with technical horticulture skills.

Table 1

Industries' Perceptions of the Importance of Technical Skills and Non-Technical Skills (n = 119)

Rank	Variable	Mean[a]	SD	% Agree
1	Verbal communication skills > written skills	2.92	.60	76%
2	Professionalism is best represented by horticultural knowledge	2.74	.78	61%
3	Communication skills > horticultural skills	2.73	.66	61%
4	Plant identification skills > writing skills	2.66	.79	59%
5	Completing a task > evaluating work in progress	2.65	.60	57%
6	Math skills < horticultural skills	2.57	.65	55%
7	Explaining how to do a job > doing the job	2.55	.79	46%
8	Identifying plant material > identifying pests	2.38	.60	37%
9	Assessing customer needs > solving those needs	2.36	.57	36%
10	Marketing/sales skills > horticultural skills	2.36	.60	33%
11	Plant identification skills > communication skills	2.33	.54	35%
12	Horticultural skills > speaking and listening skills	2.12	.57	23%
13	Knowing horticulture information > relating that information	2.10	.64	24%
14	Computer skills > communication skills	1.85	.48	3%
15	Computer skills > verbal communication skills	1.80	.46	3%

[a] 4 = strongly agree; 3 = agree; 2 disagree; 1 = strongly disagree.
> = more important than; < = less important than.

Employers distinguished between verbal and written communication skills with 76% identifying verbal communication skills as being more important for employees when compared to written communication skills. Twenty-three percent of employers perceived technical horticulture skills as being more important when compared to speaking and listening skills for employees. Twenty-four percent of the employers perceived knowing horticultural information as being more important when compared to relating information to customers. Less than 5% of the employers believed that computer skills were more important when compared to communication skills.

Seventy-nine percent of the landscape/nursery classification perceived verbal communication skills as more important when compared with writing skills. Only 35% of the landscape/nursery employers perceived plant identification skills to be more important when compared to communication skills. Sixty-two percent of the landscape/nursery employers felt that professionalism was best represented by horticultural knowledge.

Seventy-four percent of the lawn care/turfgrass respondents perceived verbal communication skills to be more important when compared with writing skills. Communication skills were felt to be more important than horticultural skills by 58% of the lawn care/turfgrass respondents. Forty-seven percent of the lawn care/turfgrass employers believed that professionalism was best represented by the employee's horticultural knowledge.

Sixty-four percent of the floriculture employers felt verbal communication skills were more important when compared with writing skills. Plant identification skills were perceived to be more important than writing skills by 43% of the floriculture employers. Fifty-seven percent of the floriculture businesses felt that communication skills were more important when compared with horticultural skills. Only 14% of the floriculture respondents felt that knowing horticultural information was more important than being able to relate the information. None of the floriculture respondents felt that computer skills were more important for their employees when compared to communication skills.

To measure the differences among the three types of businesses, a cross-tabulation was calculated for the 15 statements on the instrument using the Chi-square statistic. No statistically significant differences were found in comparing landscape/nursery, lawn care/turfgrass and floriculture businesses on 13 of the 15 statements. There was a statistical difference among the three business types for two of the statements: verbal communication skills are more important when compared to written communication skills and identifying plant material is more important when compared to identifying plant pest problems. Seventy-nine percent of landscape/nursery employers and 74% of lawn care/turfgrass employers agreed that verbal communication skills were more important when compared to writing skills. Sixty-four percent of the floriculture employers agreed with this statement. Forty-seven percent of landscape/nursery employers agreed that identifying plants is more important when compared to identifying plant pest problems. Twenty-one percent of the floriculture employers agreed with the statement and 10% of the turfgrass employers were in agreement. These statistical differences were produced with relatively small cell sizes.

Employers' Responses to Open-Ended Questions

Each employer was asked to give short answers to four open-ended questions. When asked what they would add to postsecondary two year education in horticulture, the employers identified two main additions: communication skills and business-related skills. Communication skills included responses such as customer relations, salesmanship, relating information, listening ability, and basic communication skills. Business skills included accounting, marketing, budgeting, and profit analysis. Other skills that employers would add to postsecondary two year education included receiving hands on experience and understanding the relationships among horticultural businesses (e.g., how the horticulture industry interacts and what a specific type of business in horticulture does).

Twenty-six percent of horticultural employers, when asked in what general areas new employees need to be trained, responded with communication skills. These skills included such responses as listening ability, customer relations, and salesmanship. The second highest response to what areas new employees need to be trained in was horticultural skills. These horticultural skills included a wide range of specific skills needed in each type of business. Other areas mentioned as those in which new employees need to be trained were: business skills, hands on work and knowledge of horticultural businesses.

When asked what characteristics horticultural businesses look for in choosing management personnel, the two most frequently mentioned characteristics were communication skills and self motivation. Other characteristics that were mentioned were a good personal appearance, problem solving ability, business skills and experience.

Employers expected two year college graduates to possess both horticultural skills and communication skills. Fourteen percent of the employers identified self motivation as a characteristic they would expect from a two-year institution graduate. Problem solving ability, experience, and a good personal appearance were also characteristics expected from a two-year institution graduate.

CONCLUSIONS AND RECOMMENDATIONS

The conclusions are based on the interpretation of the analysis of the data presented in the study.

A common goal of postsecondary two year institutions is to better prepare students for the work force. Research should be done on a continuing basis to keep up to date with respect to changes in student and industry needs (Cosand, 1979). This study on employers' perceptions of technical and non-technical skills for horticultural employees follows the suggestion for continuing research in industry needs. In a needs assessment study (Murphy & Jenks, 1982), employers identified non-technical skills as being either necessary or desirable for obtaining employment. The data of this study on employers' perceptions of technical and non-technical skills suggest the importance of communication skills, particularly verbal skills, for horticultural employees. Employers perceive that technical horticulture skills are inadequate without communication skills. The findings do not indicate a lack of importance of technical horticulture knowledge. Since all three business classifications tend to agree that communication skills are more important when compared to technical skills, postsecondary two year institution instructors should plan lessons and activities so that both technical and non-technical skills are emphasized.

Although all three business classifications agree on many statements, there are some noticeable differences. Floriculture businesses found writing skills to be more important when compared to plant identification skills; the other two business classifications did not. Lawn care/turfgrass employers felt that the ability to explain to others how to do a job was more important than doing the job, while landscape/nursery and floriculture disagreed. Floriculture was the only business classification that perceived the ability to assess customer need as being more important when compared to solving that need. Less than 50% of the lawn care/turfgrass employers agreed that professionalism was best represented by an employee's horticultural knowledge.

The following recommendations are made to instructors, administrators, students and curriculum developers at postsecondary two year institutions:

1. Results of this study indicate that curriculum planning committees at postsecondary two year institutions should create new or modify existing courses to combine communications and other non-technical skills into the curriculum offered.
2. There are enough differences in employers' perceptions to warrant closer comparisons among classifications before curriculum is established to prepare individuals for any one of the three types of businesses.
3. This research was not a comprehensive study of all non-technical skills. Information regarding the importance of other non-technical skills such as problem solving ability and human relations skills should be researched further.

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EMPLOYERS' PERCEPTIONS OF TECHNICAL AND NON-TECHNICAL SKILLS NEEDED BY HORTICULTURAL EMPLOYEES

A Critique

John Hillison, Virginia Tech - Discussant

The paper begins with a rather thorough discussion of the importance of two year post-secondary institutions in the United States. Included are facts and figures as well as a bit of history.

The study has a clear statement of purpose. It also has two well stated and eventually achieved objectives. A clearly identified target population was described.

The instrument was carefully developed by the researchers. Emphasis was given to establishing content validity and measuring reliability. Apparently, the instrument was understandable and collected the kind of data desired by the researchers. The instrument not only collected Likert-type data, but also forced respondents to compare one set of skills to another.

The conclusions and recommendations follow closely the results shared. They are conservatively and logically drawn.

My first question has to do with the title. Why not add something about postsecondary education to it? Perhaps end the title "with implications for postsecondary education."

The theoretical base strongly emphasizes postsecondary. Perhaps this emphasis is at the expense of two other points. No mention was made of horticulture or of Ohio in the Theoretical base. Why does the study use horticulture as the technical field? Why were data collected in Ohio?

The response rate from subjects was lower than desired. I noted that follow-up procedures attempting to enhance the response rate were used. Were incentives also used? Who signed the cover letter? Was it someone in the horticulture industry that the subjects would know? The telephone follow-up of non-respondents must be considered a good procedure. However, a question must be asked about the 13 of 21 who apparently did not respond by answering the instrument. Did they then complete the instrument or were they not there to answer the phone, or did they simply refuse to complete the instrument under any circumstances? I am a bit concerned about the proportional difference in the response rate of the three categories of businesses in the study. Why are 56% of the sample classified as landscape/nursery and 64% of the respondents so classified? Why are 27% of the sample classified as lawn care/turfgrass and 19% of the respondents so classified? What causes such a difference in response rates.

We have another study that says both technical and non-technical skills are important. The overall importance goes to non-technical skills. One of the conclusions is that, "...postsecondary two year institution instructors should plan lessons and activities so that both technical and non-technical skills are emphasized." I wonder if any of us might have been a bit suspicious about that before the study was started? As with a previous study critiqued, I believe it is time to pay attention to what employers are saying. The real problem is not our lack of knowledge concerning what employers believe. The real problem is agricultural education's unwillingness to make the necessary curriculum changes.

FACTORS ASSOCIATED WITH PREFERRED LEARNING STYLES OF VOCATIONAL AGRICULTURE STUDENTS

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INTRODUCTION

A developmental research project conducted in the College of Agriculture, The University of Arizona was designed to identify and describe preferred learning styles of secondary school students enrolled in vocational education programs. The initial phase of the project utilized vocational home economics students to assess preferred learning styles. The second phase, which is the subject of this paper, further validated the characterization of learning styles with a larger population of students enrolled in vocational agriculture.

Recent articles reported the process used to measure the learning style characteristics of selected students in secondary vocational education programs (Kendall and Sproles, 1986; Kendall, 1986). Those two studies explored the learning styles of a sample of vocational home economics students. Using the experiential learning theory of Kolb (1984) as a basis, the studies identified six characteristics of learning styles typifying students in vocational home economics classrooms: (a) serious, analytical learner, (b) active, practical learner, (c) observation-centered learner, (d) passive, accepting learner, (e) concrete, detailed-oriented learner, and (f) non-adaptive, struggling learner. Variations of those learning styles by grade levels, prior vocational education coursework completed and gender were also examined.

This paper reports a study which validated the learning style characteristics and replicated and extended the Kendall and Sproles' study of learning styles. This research analyzed the characteristics in a larger, demographically diverse census of vocational agriculture students in Arizona.

PURPOSES AND OBJECTIVES

The purpose of the study was to identify factors affecting preferred learning style characteristics of students in vocational agriculture.

The specific objectives of the research were designed to answer two questions: (1) What learning styles do secondary vocational agriculture students prefer? and (2) Do these preferred learning styles vary by grade levels, years of vocational agriculture coursework completed, and gender?

PROCEDURE

The Secondary Learning Styles Inventory developed by Kendall and Sproles, (1986) was administered to 9th through 12th grade vocational agriculture students in secondary schools throughout Arizona during April, 1986. Forty-one of 46 vocational agriculture programs representing 2,101 students participated in the study. Students completed the Inventory during a vocational agriculture class. The instrument was administered by the teacher who read directions from a prepared script. Completed questionnaires were reviewed and those instruments which were incomplete were deleted.

ANALYSIS OF DATA

The six major characteristics (factors) of learning styles were validated through factor analysis using the principal components method with varimax rotation of factors (Sproles, Cox, Sproles, 1988). Factor loadings are detailed in the results section which follows. The factor analysis results established the construct and content validity of the six factor model for vocational agriculture students.

Data analysis followed two approaches. First, to identify preferred learning styles, frequencies of responses to the statements loading on each factor were recorded. Those subjects who "agreed" or "strongly agreed" were combined into a single category thus measuring the overall percentage who expressed preference for the learning style. The second objective was addressed by separately crosstabulating grade levels, years of vocational agriculture completed, and gender against each learning style statement. Each statement was collapsed to two points for this analysis. Percentages of those who agreed with the statement (those preferring that learning style), and those who were neutral or disagreeing (those with no preference or a dislike for that learning style) were calculated. This technique isolated the subjects' preference for each learning style. The Chi Square statistic was used to test the significance of each crosstabulation.

RESULTS

A total of 1,994 complete and usable instruments were included in the final data analysis. The accessible population was 32% female and 68% male. Thirty-nine percent of the subjects were in ninth grade, 28% in the 10th, 20% in the 11th, and 13% in the 12th grades. Forty-three percent of the sample were 14-15 years old and 57% were 16-18 years old.

Factor loadings of specific items which validated and described the six learning style characteristics are shown in Table 1. Factor one was loaded .46-.73, Factor two .44-.73, Factor three .59-.78, Factor four .59-.74, Factor five .40-.68, and Factor six ranged from a -.53 to .62. The negatively loaded item was reverse worded.

Further data analysis, as shown in Table 2, indicated approximately six of ten students preferred a "serious, analytical" learning style. In addition, about three-fourths of the subjects preferred "active, practical learning" (experiments, actually doing things). Likewise, over two-thirds preferred observation-centered learning as well. This may suggest a learning style that features "first observe, then do" is appropriate for the majority of vocational agriculture students. The demonstration methodology utilized by vocational agriculture teachers thus appears to be sound.

Lesser utilized learning styles, and perhaps learning problems were identified in a substantial proportion of students. For example, perhaps 20% to as much as 35% of the subjects preferred passive learning. Students with such a learning style may contrast sharply to the more active student learners, and need special attention.

Additional findings resulted in the isolation of at least three factors which were associated with variations in preferred learning styles. Those were: grade level, years of vocational agriculture completed, and gender. Statistically significant Chi Square values were observed for certain statements associated with learning style. Results revealed significant differences existed for two of the six learning styles; serious, analytical learner, and active, practical learners between ninth and twelfth graders (Table 3). Preferences for these styles appeared to increase with grade level. Similarly, preference for these two learning styles increased with the number of years of vocational agriculture coursework completed as shown in Table 4, particularly with four year program completers. Also, data indicated students who completed more years of vocational agriculture coursework were more concrete, detailed learners.

Differences in preferred learning styles were observed between the genders as presented in Table 5. Male students were more likely to prefer actual hands-on, manipulative experiences than females. Females, on the other hand, were less likely to prefer experimentation and breaking subject matter down into detailed, separate parts. Male vocational agriculture students were less inclined to prefer note-taking and factual learning than females.

CONCLUSIONS AND/OR RECOMMENDATIONS

This research examined preferred learning styles of secondary vocational agriculture students. The following conclusions and recommendations are presented:

1. Six learning style characteristics were identified and further validated.

2. Significant variations were observed in learning style preferences between grade levels, years of vocational agriculture coursework completed, and gender.

3. Use of a simple paper and pencil measure such as Secondary Learning Styles Inventory may aid teachers in establishing a class profile of how students prefer to learn. Teachers can then, based upon the profile, adjust teaching methodologies to better match the preferred learning style of a class.

4. Current instructional practice in vocational agriculture seems to concentrate a majority of time in classroom instruction rather than practical exercises during the first two years. Likewise, during the junior and senior years, in general, more time is devoted to practical laboratory and "hands-on" activities outside the classroom. This research indicates that as students complete more years of vocational agriculture their learning style becomes more concrete, detail, fact-oriented. Also, a substantial portion of first and second year students who are 14-15 years of age are active, practical learners. Hence, it should be considered by teachers to incorporate additional hands-on, experiential, and actual performance activities into the first two years of instruction. In addition, teachers should consider incorporating additional "informational lessons" and multifaceted teaching strategies into the last two years of instruction in vocational agriculture.

5. The findings of this research extended Kendall's (1986) research on variations in learning styles among vocational home economics students. Similar levels of preference for each learning style were found in both this and the Kendall study, on all six characteristics.

6. Continued research is necessary to complete the characterization and categorization of learning styles of secondary school students.

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Table 1. Factor Loadings of Learning Style Characteristics

FACTORS	FACTOR LOADINGS
FACTOR 1 -- SERIOUS, ANALYTICAL LEARNER	
I like to think things out rationally and carefully.	.73
In learning, I value careful and logical thinking.	.68
I enjoy thinking through things and making decisions.	.63
I think seriously and think back on what I learn.	.57
I enjoy putting together new ideas and thoughts.	.47
I like hearing about new ideas and facts.	.46
FACTOR 2 -- ACTIVE, PRACTICAL LEARNER	
Actually doing things is my preferred way of learning.	.73
I learn more through actual experience and practice with a subject.	.67
I prefer learning actual practices, not theories.	.62
I enjoy doing experiments to see how things work.	.57
I learn well from practical and useful activities.	.48
I learn well when I'm emotionally involved and excited.	.44
FACTOR 3 -- OBSERVATION-CENTERED LEARNER	
I learn well by watching what others do.	.78
Observing is a good way for me to learn.	.75
FACTOR 4 -- CONCRETE, DETAIL, FACT-ORIENTED LEARNER	
I enjoy taking notes and writing down facts I learn.	.74
I like to look at things in detail, breaking them down into separate parts.	.59
FACTOR 5 -- PASSIVE, ACCEPTING LEARNER	
I usually accept things I learn without questioning them.	.68
I learn best when I listen quietly rather than speaking up in class.	.64
I think mainly about today, not tomorrow.	.59
I learn only if I put in lots of work and energy.	.40[a]
FACTOR 6 -- NON-ADAPTIVE, STRUGGLING LEARNER	
In many learning situations I feel unsure and uncertain.	.62
I quickly understand things I learn, almost by intuition.	-.53
I learn only if I put in lots of work and energy.	.46[a]

Note. [a]Item with factorial complexity of 2.

Table 2. Learning Style Preferences of Vocational Agriculture Students

Statements Measuring Learning Style Characteristics	Agreement %
FACTOR 1 -- SERIOUS, ANALYTICAL LEARNER	
I like to think things out rationally and carefully.	60
In learning, I value careful and logical thinking.	57
I enjoy thinking through things and making decisions.	57
I think seriously and think back on what I learn.	57
I enjoy putting together new ideas and thoughts.	66
I like hearing about new ideas and facts.	73
FACTOR 2 -- ACTIVE, PRACTICAL LEARNER	
Actually doing things is my preferred way of learning.	74
I learn more through actual experience and practice with a subject.	80
I prefer learning actual practices, not theories.	65
I enjoy doing experiments to see how things work.	76
I learn well from practical and useful activities.	76
I learn well when I'm emotionally involved and excited.	68
FACTOR 3 -- OBSERVATION-CENTERED LEARNER	
I learn well by watching what others do.	64
Observing is a good way for me to learn.	77
FACTOR 4 -- CONCRETE, DETAIL, FACT-ORIENTED LEARNER	
I enjoy taking notes and writing down facts I learn.	17
I like to look at things in detail, breaking them down into separate parts.	41
FACTOR 5 -- PASSIVE, ACCEPTING LEARNER	
I usually accept things I learn without questioning them.	20
I learn best when I listen quietly rather than speaking up in class.	37
I think mainly about today, not tomorrow.	27
FACTOR 6 -- NON-ADAPTIVE, STRUGGLING LEARNER	
In many learning situations I feel unsure and uncertain.	21
I quickly understand things I learn, almost by intuition.	32[a]

Note. n = 1994

[a] This item is reverse worded. Forty-nine percent of subjects responded "neutral" to this statement, and 19% "disagree" or "strongly disagree," implying a large percentage of learners experiencing some learning difficulties.

Table 3. Variations in Learning Style Preferences by Grade Level

Statements Measuring Learning Style Characteristics	Percent Agreement by Grade Level 9	10	11	12
SERIOUS, ANALYTICAL LEARNER				
In learning I value careful and logical thinking.	52	56	61	67**
I enjoy thinking through difficult things and making wise decisions.	53	59	59	64**
ACTIVE, PRACTICAL LEARNER				
Actually doing things is my preferred way of learning.	71	75	74	85**
I prefer learning actual practices, not theories.	60	66	68	70**

Note. n = 1994
**p<.01

Table 4. Variations in Learning Style Preferences by Number of Years of Vocational Agriculture Completed

Statements Measuring Learning Style Characteristics	Percent Agreement by Years Completed 1	2	3	4
SERIOUS, ANALYTICAL LEARNER				
I like to think things out rationally and carefully.	57	65	57	68**
In learning I value careful and logical thinking.	53	58	59	70**
I enjoy thinking through difficult things and making wise decisions.	53	61	61	69**
ACTIVE, PRACTICAL LEARNER				
Actually doing things is my preferred way of learning.	70	79	79	87**
I learn more through actual experience and practice with a subject.	79	84	78	84**
I prefer learning actual practices, not theories.	61	71	65	72**
CONCRETE, DETAIL, FACT-ORIENTED LEARNER				
I like to look at things in detail, breaking them down into separate parts.	39	46	39	46*

Table continues

PASSIVE ACCEPTING LEARNER				
I learn best when I listen quietly rather than speaking up in class.	40	36	32	31*
I think mainly about today, not tomorrow.	30	25	22	27*
NON-ADAPTIVE, STRUGGLING LEARNER				
I quickly understand things I learn, almost by intuition.	30	38	32	37**

Note. n = 1994
*p<.05 **p<.01

Table 5. Variations in Learning Style Preferences by Gender

Statements Measuring Learning Style Characteristics	Percent Agreement by Gender	
	Female	Male
ACTIVE, PRACTICAL LEARNER		
Actually doing things is my preferred way of learning.	69	77**
I prefer learning actual practices, not theories.	59	67**
OBSERVATION-CENTERED LEARNER		
Observing is a good way for me to learn.	74	79**
CONCRETE, DETAIL, FACT-ORIENTED LEARNER		
I enjoy taking notes and writing down facts I learn.	21	16**
I like to look at things in detail, breaking them down into separate parts.	37	43**
PASSIVE, ACCEPTING LEARNER		
I learn best when I listen quietly rather than speaking up in class.	33	39*
I think mainly about today, not tomorrow.	22	30**
NON-ADAPTIVE, STRUGGLING LEARNER		
I quickly understand things I learn, almost by intuition.	26	35**

Note. n = 1994
*p<.05 **p<.01

FACTORS ASSOCIATED WITH PREFERRED LEARNING STYLES OF VOCATIONAL AGRICULTURE STUDENTS

A Critique

L. H. Newcomb, Ohio State University--Discussant

This study was refreshing. It opens a whole new vista of possibilities; possibilities which deserve our careful attention and demand our keenest introspection. This work brings to the usual agricultural education inquiry a stimulating ambience. It is carefully undergirded with excellent psychological research.

It also builds on previous work in vocational education. The authors are to be applauded for including new audiences along with the concomitant intent of verifying earlier findings. Research in agricultural education needs to follow these scholars' pattern more frequently than is usually the case.

Beyond being fascinated with this topic, I found this paper to be well constructed. It is clear, concise, and easy to follow; hallmarks of sound scholarship. The only place where this paper begged for greater detail was in the procedure section. As written, it would be difficult for most readers to replicate the study; that after all is the acid test.

The paper does raise some questions and concerns. A word of caution is offered regarding routinely using teachers to collect data. Measurement is already the most vulnerable part of social science research. To delegate data collection to a large number of untrained and unsupervised data collectors is worrisome. If this practice must be followed, evidence should be offered that verifies the function was carried out appropriately.

What was the conceptual framework that led to the inclusion of grade level, years of vocational agriculture, and gender as variables of interest? Was there a rationale built for their selection? If there was no framework (I could fine none), why weren't variables such as self-concept, locus of control, I. Q., Myers-Briggs Profiles or others from the universe of possibilities used? The case needs to be developed that the variables selected were chosen because a strong conceptual framework dictated that choice.

The authors speak of a preferred style of "first observe, then do," but what are the consequences of this type of learning? Should instructors cater to it? The charge is leveled that passive learners need special attention. Why is this so? Does this reflect the bias of the researchers or did the authors fail to share the basis for the assertion?

The findings indicate that as age and years in vocational agriculture increase, students prefer serious, analytical and active, practical learning. This is an important finding. Continue to probe it. The findings regarding females tend to conform to stereotypic views of that sex. Why? Is there psychological justification for this phenomenon? What else needs to be known?

The findings of this study are similar to Kendall's earlier work in home economics. Why? Was this to be expected? What does it mean?

Finally don't stop here. Explore the full range of meaning enveloped herein. Pursue the truth that lies within this vein of inquiry. The profession will be better for your efforts.

FACTORS CONTRIBUTING TO HEARING LOSS AMONG TEACHERS OF AGRICULTURAL MECHANICS

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INTRODUCTION

The presence of machine noise levels in vocational laboratories which exceed the safety limits established by the Occupational Safety and Health Administration (OSHA) have been well documented (Bear, 1969; Miller & Shinn, 1986; Plakke, 1985; Woodford & O'Farrell, 1983; and Wall & Jessee, 1971). Laboratories which teach agricultural mechanics, general shop, woodworking, metal working, welding and power mechanics are most suspect of having unsafe noise levels generated by their educational activities (Plakke, 1985). Further, O'Neal (1986) noted that high frequency machine sounds, such as those produced by power woodworking equipment, are most likely to cause hearing damage.

Suter (1984) noted that the OSHA hearing regulations are only minimum standards. Some audiologists contend that OSHA standards do not prevent hearing loss and that further research evidence is needed to assist in refining the noise and duration levels necessary to protect the hearing of workers exposed to loud work noise (H. Kaplan, personal communication, August 22, 1986). Suter (1984) further indicated that approximately 5.5 million people are estimated to be working in conditions which need hearing protection devices. Teachers of agriculture in one school were found to be working in a laboratory with an excessive noise level (Grayson County Vocational School, personal communication, March 5, 1986). The noise produced by the planer, radial arm saw, shaper, and dust collecting system was individually and collectively capable of causing hearing loss, when compared to OSHA standards.

At the secondary level, most hearing and noise studies have focused upon the learning difficulties (Jewell, 1977) and hearing losses encountered by students. However, it is known that teachers encounter much longer exposure to loud noise than do students because of multiple sections of laboratory classes (Roeser, 1980).

This study recognizes that teachers of agriculture are involved in teaching mechanics full or part time in their programs of vocational agriculture. Evidence suggests (Wall & Jessee, 1971) that many vocational agriculture programs have noise and duration levels which exceed OSHA standards. Hence this investigation was designed to study the hearing losses and relationships of hearing losses occurring among Virginia teachers of agriculture.

PURPOSE AND OBJECTIVES

The purpose of this study was to describe and determine the hearing losses and perceived hearing losses occurring among Virginia agricultural teachers. Specifically the study attempted to answer the following questions:

1. Are Virginia teachers of agriculture encountering hearing losses greater than other individuals of similar age?
2. If hearing losses do occur, where are they occurring and what is the severity?
3. If hearing losses occur among Virginia teachers of agriculture, how are they dispersed by age and years of teaching experience?
4. Do teachers perceive themselves to be incurring hearing loss because of noise emitted from equipment in their agricultural mechanics laboratory?
5. What equipment contributes to excessive noise levels in agricultural mechanics laboratories?
6. What out-of-school activities may be contributing to hearing difficulties of Virginia teachers of agriculture?
7. What relationship exist between perceived exposure to noise and perceived hearing loss?
8. What relationships exist between perceived hearing loss and actual hearing loss?

PROCEDURE

Population

This investigation was conducted as a descriptive study with Virginia vocational agriculture teachers. The study took place during the 1986 Virginia Agricultural Teachers Conference. A stratified random sampling procedure was used in selecting subjects; the sample was stratified by years of teaching experience. A sample of 75 subjects was drawn, given a confidence interval of .95 and a .10 degree of precision, using the Krejcie & Morgan (1970) formula for sample size selection.

Instrumentation

Hearing tests were administered by a certified audiologist. The audiologist calibrated all audiometers and supervised the hearing tests. Hearing was tested at 500, 750, 1000, 1500, 2000, 3000, 4000, and 6000 Hertz (Hz) levels. Results for the left ear and right ear were recorded.

Descriptive data were collected via a researcher prepared instrument. The descriptive instrument was derived from a validated hearing survey form and altered to fit situations specific to Virginia teachers of agriculture. The hearing instrument was subjected to review by a panel of experts and yielded a .84 alpha coefficient of reliability.

Data Collection

Hearing tests were made and questionnaires were filled out prior to the opening of the conference. The researcher administered all questionnaires; individual instructions were related to subjects as they showed up for the hearing test. Because of the time, space and budget limitations, it was essential that subjects have hearing tests made and questionnaires completed during the 3-hour registration period immediately prior to the opening of the conference. Subjects were tested in the order in which they registered for the conference. Because of the prestated limitations only 57 subjects were tested for hearing loss and 66 subjects completed the questionnaire. The remaining subjects reported for the hearing test and questionnaire completion but time limitations prevented them from completing either part of the study.

Data Analysis

Descriptive statistics were used to summarize and analyze the data. Statistical analysis was made by use of the Statistical Package for the Social Sciences version 2.1. Statistics employed were frequencies, means, measures of central tendency, measures of association and percentages.

Hearing tests were individually evaluated by a certified audiologist. OSHA tables were used to adjust the hearing test result of each individual for the aging factor.

RESULTS

The data indicated that the 57 people tested (53 usable) for hearing, 14 subjects for 26.4% had hearing losses greater than others their own age (refer to Table 1. Because hearing naturally declines with age, OSHA tables were used to correct hearing results for the aging factor.

The data revealed that of the 14 teachers incurring hearing losses, 5 sustained losses in both ears; 8 sustained losses in the left ear and only 1 teacher had loss exclusively in the right ear (see Table 2).

Table 1. Hearing Loss Corrected for Aging

No. tested for hearing loss	No. found with hearing loss	Percent found with hearing loss
53	14	26.4

Note. Percent with hearing loss after corrected for the aging factor

The data in Table 2 further indicate that most hearing losses were sustained in the left ear and the losses were mild to moderate in severity. No teachers were found to have severe hearing losses.

Table 2. Location and Severity of Hearing Losses

Location	n	Severity of Loss Mild	Moderate	Severe
Left ear	8	7	1	0
Right ear	1	1	0	0
Both ears	5	5	0	0

A description of hearing losses by age and by years of teaching was compiled. The data indicate that hearing loss, in excess of the natural decline due to aging, begins between the 6th and 10th years of teaching and between 30 and 35 years of age. After the 10th year of teaching and age 35 hearing loss is fairly evenly distributed across the remaining years of teaching and age (see Table 3).

Of the teachers in the study, 54% believed they had hearing losses greater than other people their own age. Seventy six percent of those who felt they had hearing loss, believed it to be caused by loud machine noise present in their agricultural mechanics laboratory. Forty six percent of the teachers did not believe they had a hearing loss problem.

Table 3. Teachers Encountering Hearing Loss by Age and Teaching Experience

Years of age	n	No. of teachers sustaining hearing loss	Years of teaching	n	No. of teachers sustaining hearing loss
22 - 29	10	0	0 - 5	10	0
30 - 35	9	2	6 - 10	9	1
36 - 40	9	3	11 - 15	9	2
41 - 45	9	3	16 - 20	9	4
46 - 50	10	2	21 - 25	10	3
51 - 55	7	3	26 - 30	7	3
56 - 60	2	0	31 - 35	3	1
61 - 65	1	1			

The data indicate that teachers felt power woodworking equipment contributed the most to noise pollution in their laboratories (refer to Table 4). The machines perceived to be the loudest were the planer, radial arm saw, dust collecting system, portable circular saw, table saw, router, and grinder.

The data further revealed that of the 66 teachers responding to the questionnaire, 22 teachers indicted they had noisy hobbies while 41 teachers indicated they did not have noisy hobbies (refer to Table 5). Four teachers did not respond to the questions relating to noisy hobbies. The most prevalent noisy hobbies were tractor and machinery operation, hunting and targetshooting, woodcutting and chainsaws and woodworking.

Table 4. Teacher Perceptions of the Loudest Agricultural Mechanics Laboratory Equipment

Rank order loudest to quietest	f	M^a	SD
Planer	61	1.213	.661
Radial arm saw	41	2.390	.919
Dust collector	32	3.375	1.289
Table saw	33	3.485	.972
Jointer	30	3.667	1.093
Grinder	11	3.545	1.293
Portable grinder	16	3.625	.806
Portable circular saw	9	3.444	1.130
Router	33	3.545	1.277
Belt sander	3	4.667	.577
Other	21	3.286	1.309

Note. a - Sum of rank order values divided n

Table 5. Loud Teacher Activities Outside of School

Noisy hobbies	f
Tractor and machinery operation	7
Hunting and targetshooting	7
Woodcutting and chainsaws	4
Woodworking	3
Truckpulling	2
Small engine and lawnmowers operation	2
Honey bee care	1
Sheepshearing	1

Note. Some respondents listed multiple activities

According to Cohen (1977) effect size may be interpreted as r = .10 - small; r = .25 - medium; and r = .50 - large. A medium (r=.25), association was observed between perceived hearing loss and exposure to loud noise in the mechanics laboratory. A small to medium correlation (r=.23) was observed between perceived hearing loss and overall exposure to noise.

Objective seven correlated actual hearing loss, as measured in the left and right ears, with teacher perceptions of hearing loss. Table 6 data indicate the strongest association was with the left ear at the 3000 (Hz) level; a large correlation ($\underline{r}$=.50) between the two variables was calculated. Other left ear correlations were: 1000 Hz, $\underline{r}$=.21; 2000 Hz, $\underline{r}$=,34; 4000 Hz, $\underline{r}$=.30 and 6000 Hz, $\underline{r}$=.21).

Table 6. Relationship of Perceived Hearing Loss with Actual Hearing Loss

Perceptions of hearing loss	Actual Hearing Loss 1000 Hz	2000Hz	3000Hz	4000Hz	6000Hz
Left ear	.21*	.34*	.50**	.30*	.21
Right ear	.25*	.25*	.26*	.16	.28

Note. Relationships determined by Pearson Product-Moment Correlation Coefficient (Pearson r)
*p<.05, **p<.001

Medium associations between the two variables were computed at the 2000 and 4000 Hz levels. Small and medium associations were noted at the 1000 and 4000 Hz levels, respectively. For the right ear, medium correlations were computed for each Hz level (1000 Hz, $\underline{r}$=.25; 2000 Hz, $\underline{r}$=.25; 3000 Hz, $\underline{r}$=.26 and 6000 Hz, $\underline{r}$=.28) except the 4000 Hz, which was a small correlation ($\underline{r}$=.16), (see Table 6).

CONCLUSIONS

Based on the findings of this study the following conclusions were made:

1. Some teachers of agriculture in Virginia are experiencing hearing losses greater than the natural decline due to aging.

2. The frequency of hearing loss in the left ear verses the right ear indicates that some harmful noises are being emitted nearer the left ear than to the right. Given the nature of outside school activities and hobbies of the teachers, the source of all harmful noises may not be in the agricultural mechanics laboratory.

3. Hearing losses tend to show up between 5 to 10 years of teaching and around 30 years of age; they are mild to moderate in severity. This developmental pattern suggests that hearing losses tend to be gradual and subtle in nature.

4. Virginia teachers of agriculture believe they are sustaining hearing losses greater than other people of a similar age. Since 26.4% of the Virginia teachers are having hearing losses it may be concluded that the above perception is true.

5. Hearing safety should be taught and personal protective hearing devices should be used when working with loud equipment in the agricultural mechanics laboratory.

6. Teachers should be aware that loud out of school activities are likely contributing to their hearing losses and that hearing protection devices should be used while engaged in activities with intense noise levels.

7. A small relationship does exist between perceived hearing loss and perceived exposure to noise; however, this relationship has little practical significance.

8. Large and medium correlations exist between perceived hearing loss and actual hearing loss. This finding indicates that teachers accurately perceive hearing losses after they have been sustained. Since the greatest hearing losses were found to be in the 3000 to 4000 Hz bands and instructors acknowledge teaching in the presence of loud power equipment, they are sustaining industrial hearing loss. This conclusion is in agreement with audiologists who reveal that industrial hearing loss occurs in the 3000 and 4000 Hz bands.

DISCUSSION AND RECOMMENDATIONS

1. Further study needs to be made of noise in the agricultural mechanics laboratory to determine long term effects on students and teachers and to more accurately access the noise conditions under which individuals must study and work.

2. Audiologists should be utilized by schools systems to monitor hearing threshold shifts occurring among teachers and students involved with agricultural programs which have loud machine noise levels.

3. Given the facts that much agricultural mechanics equipment is loud and that agricultural mechanics teachers are sustaining hearing losses, greater emphasis should be given to developing and implementing hearing conservation programs for secondary programs of agricultural mechanics.

4. Hearing conservation efforts should be equal in emphasis and practice to eye safety programs.

5. Teacher educators should be aware of the hearing difficulties being encountered by practicing teachers and incorporate more preventive hearing conservation measures into preservice and inservice activities.

6. State Departments of Education, local school systems and teachers should be encouraged to purchase equipment items which have been engineered for low noise emission to help gain accoustical control of the agricultural mechanics learning environment.

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FORECASTING EMERGING KNOWLEDGE AND SKILLS FOR PART-TIME AGRICULTURE

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INTRODUCTION

Vermont, like many states, is experiencing a trend of an increasing number of small scale/part-time farms and agricultural businesses which is expected to continue in the future (An Agricultural Development Policy, 1986; Clapp and Harris, 1985; Northeast Regional Council, 1987; Office of Technology Assessment, 1986; The Vermont Forest Resources, 1986).

A study of the future educational needs of persons preparing for or engaged in part-time/small scale agriculture was important in order to plan changes needed with programs of vocational agriculture and natural resources education. The process used should identify future educational needs as well as generate support for necessary educational policy and curricula changes.

For this study, small scale/part-time farming was defined as providing essential, supplementary income and/or products that contribute to the family's total income and improves their lifestyle (Bartlett, 1986).

PURPOSE AND OBJECTIVES

The purpose of the research was to determine emerging knowledge and skills that individuals engaged in part-time agriculture will need during the 1990's. The research objectives of the study were:

1. identify individuals knowledgeable about part-time agriculture in Vermont;
2. identify emerging agricultural trends and events likely to impact part-time agriculture in Vermont in the future; and
3. identify the new knowledge and skills needed by individuals preparing for or engaged in part-time agriculture by 1995.

PROCEDURE

The Delphi technique has been widely used as a forecasting tool in educational planning (Duryee, 1982; Ruff, Shylo, and Russell, 1981). Described as a method of choosing among alternative policies that affect the future (Helmer, 1967), successful use of the Delphi technique is dependent upon panel selection (Ruff et al., 1981). It has been modified to identify expected technological innovations (Lawrence, 1980).

The Delphi technique was modified for this study as follows:

1. the authors generated items for the initial questionnaire;
2. there were only two rounds with the questionnaire; and
3. the Delphi panel was limited to making independent judgments on expected future trends. A technical panel then met to forecast expected new knowledge and skills in part-time agriculture.

For objective one, a peer nomination process consisting of three rounds with a mail questionnaire was used to create a pool of experts for the Delphi (Scheele, 1975). The 100 most frequently nominated individuals, stratified by agricultural specialty (Malitz, 1981) were then selected as a panel of experts for objective two. Nonparticipants were contacted twice. Data were collected

FACTORS CONTRIBUTING TO HEARING LOSS AMONG TEACHERS OF AGRICULTURAL MECHANICS

A Critique

George W. Wardlow, University of Minnesota -- Discussant

This study is of great importance to both teachers and teacher educators of agricultural mechanics. The findings that hearing loss may be a problem among teachers of vocational agriculture should be cause for great concern and should certainly merit continued study by researchers and professionals.

This study was found to be well designed and the report well written. The introduction uses the literature to develop a rationale and to lead into a clear statement of purpose and objectives. The procedures are generally well conceived and well documented. The data relative to hearing loss were collected by a certified audiologist and a questionnaire instrument collected data for the remaining variables of interest.

The study found that some Virginia teachers believed they were experiencing hearing loss and, in fact, some were experiencing hearing loss. The researcher did find a relationship between perceived and actual hearing loss. The research stops short of specifically attributing the hearing loss to occupation, but leaves it to the reader to make that inference. This leaves several questions in the design of the research unanswered.

The target population of the study was Virginia vocational agriculture teachers. The accessible population of the study is not defined in the report but is implied as those teachers attending the annual teachers' conference. A sample of 75 subjects, stratified by years of teaching, was selected from the unspecified population. Seventy-six percent, or 57 of the subjects participated in the study by having their hearing evaluated and useable data were obtained from 53. However, 66 of the 75 teachers responded to the questionnaire.

Fourteen of the 53 hearing-tested respondents (26 %) were found to have varying degrees of hearing loss. This was found to be a greater rate than for the norm group. Of the 66 returned questionnaires, 22 reported having noisy hobbies. There was no indication that an effort was made to determine if these 22 included the same 14 who experienced hearing losses. An answer to this question could have improved the practical interpretation of the findings. In fact, limiting the questionnaire to those who were hearing-tested would have improved the study.

No determination was made to determine the actual noise level in the working conditions of the hearing-tested respondents. While it is realized that this was not an explicit objective of the study, this data would have strengthened the study and provided evidence for the implicit objective.

The researcher is to be commended for a study which seeks to assess the safety of working conditions for the teacher and of educational conditions for the students of vocational agriculture. The recommendation for further study in this area is a worthy suggestion.

by mail with Delphi instruments. A 72% response rate was received for round one and a 67% response rate for round two.

A technical panel was created to address objective three. This panel consisted of the 12 most frequently nominated individuals from the peer nomination process stratified by their self-reported expertise in plant production, animal production, marketing, agricultural machines and equipment, business management, or forestry.

INSTRUMENTS

All instruments used in this study were prepared by the authors. For objective one, nominators were requested to list name, mailing address, and area(s) of expertise for each nominee.

For objective two, the Delphi instrument created for round one consisted of 53 closed-end future event statements derived from a review of literature (Agriculture in the Future, 1984; An Agricultural Development Policy, 1986; Butcher, 1985; OTA, 1986). The round two instrument included the group medians and interquartile ranges from round one and five new items suggested by the participants.

For objective three, an "Examples of Possible New Knowledge and Skills for High Priority Items" instrument was created for use by the technical panel.

ANALYSIS OF DATA

Data for objective one consisted of nominee frequencies.

For objective two, the Delphi instrument elicited two projections concerning the likelihood of an event occurring and the potential impact of the event on future education and training needs. Participants rated the future event statements on a 1 (low) to 5 (high) Likert-type scale for both likelihood and impact. Group medians and interquartile ranges were calculated for each of the 106 variables on round one and 116 variables on round two.

Chi square was used to probe the ratings of the nonparticipants. Kendall's tau was used to determine whether or not there were common underlying assumptions with the future event statements on the questionnaire. The Wilcoxon signed ranks, matched pairs was used to test any deviation between rounds one and two.

For objective three, a nominal group technique (Delberg, Van De Vere, and Gustafson, 1975) was used to derive a consensus on expected new knowledge and skills needed by part-time agriculturists during the 1990's.

RESULTS

PANEL OF EXPERTS

For objective one, there were 945 peer nominations for the panel of experts. More than two-thirds of the panel of experts were reported to have expertise in agricultural production or agricultural supplies and services.

EMERGING AGRICULTURAL TRENDS AND EVENTS

Delphi Round One

The median and interquartile range were calculated for each of the 53 future event statements on the initial Delphi questionnaire. The participants suggested five new future event statements for consideration during round two.

One-half (n=14) of the nonrespondents were randomly selected and surveyed by telephone to determine if there were differences between their ratings on six randomly selected future event statements and the participant group ratings. The Chi Square values were not statistically significant ($p \leq .05$).

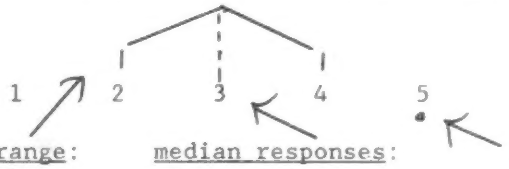
Kendall's tau was used to probe whether or not there were underlying assumptions common to the future event statements. There were 16 significant ($p \leq .001$) associations observed on the 106 likelihood and impact variables. These few associations were an indication that the future event statements were being rated independently.

Delphi Round Two

Participants were provided with data on the medians and interquartile ranges for the group and their own response from round one. They were given an opportunity to change their response. (See Figure 1.)

Figure 1. Directions for Future Events: Part-time Agriculture Survey (Round 2).

You will notice the likelihood and impact columns now have line drawings over the response areas for each possible event statement and a dot under one of the numbers. This shows the results of the first round Delphi Survey as follows:
EXAMPLE

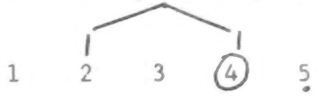


interquartile range: middle 50% of the responses are contained between the vertical bars at both ends.

median responses: of participants shown by the peak of the horizontal line connecting the interquartile range.

your response: on the first round is shown by the dot.

On the second round of the Delphi, we ask you to consider your original response to each possible event item in relation to the information provided about responses of the other participants. If you would like to alter your response as a result, circle your response as shown below.



If you do not wish to change your response, leave it as it is!
If a dot indicating your response to a possible event item is missing, you did not respond to that item in Round 1. You are welcome to do so in Round 2.

Group medians and interquartile ranges were calculated for likelihood and impact variables. The Wilcoxon matched-pairs, signed-ranks (T) was used to test the deviation of responses between rounds one and two on the original 53 items. The two-tailed T test revealed that only 4 items had significant ($p \leq .05$) changes in ratings. The authors concluded that additional iterations were unnecessary.

HIGH PRIORITY FUTURE EVENTS

A cross-impact analysis was used to identify high priority future event statements. The criteria for "high priority" established by the authors consisted of a median value ≥ 4 on likelihood of an event occurring and ≥ 3 on the educational impact were the events to occur. Table 1 reveals 27 of 58 future event statements met the high priority criteria.

NEW KNOWLEDGE AND SKILLS

Nine of the twelve member technical panel met for one day to identify expected new knowledge and skills needed by individuals preparing for or engaged in part-time agriculture by 1995. The 27 high priority future events in Table 1 were the basis for determining new knowledge and skills.

Criteria established for a "new" knowledge or skill were as follows:

> widespread application of recently discovered (or expected to be discovered) technology;

> innovative applications of existing knowledge or skills; and/or

> renewed adaptation of existing knowledge or skills.

Table 2 contains the new knowledge and skills grouped by similar purposes that the technical panel agreed upon.

Plant Production Technology

There was consensus on the need for eight knowledge and skills in plant production technology. These included propagation by tissue culture and open pollinated seeds; selection of new cultivars based on insect and disease resistance, market quality, adaptability, and test plots; use of improved soil and tissue analyses and growing season extenders; application of sustainable systems approaches; and investigating storage techniques.

Animal Production Technology

Table 2 shows the need for knowledge and skills in animal production technology. Livestock producers will need to select and manage bovine growth hormone, embryo transfer, monoclonal antibody techniques, and live animal body composition assessment; selection for disease resistance; and practices that produce leaner meats.

Marketing

There was consensus on the need for 11 knowledge and skills in marketing. This is a clear example of the need for widespread adoption of knowledge or skills that have been in existence for some time, but have had limited adoption. The competitive climate will require innovative application of such marketing techniques as developing market niches, contract marketing and product image. There will be a need to utilize marketing cooperatives, market regionally, and adopt rigorous quality control procedures.

Agricultural Machines and Equipment

Table 2 shows the need for three new knowledge and skill areas for agricultural machines and equipment. Part-time farmers will need to operate and maintain machinery and equipment with electronic and hydraulic devices.

Table 1. High Priority Future Events with Median Likelihood and Educational Impact Ratings.

Future Event Statement	Median Rating	
	Likelihood	Impact
PLANT PRODUCTION TECHNOLOGY:		
1) Increased production and insect and disease resistance will be genetically transmitted to plants	4.0	4.0
2) Plant genetics will result in higher quality products	4.0	4.0
3) Control of plant insect, disease, and weeds will be more specific to each farm	4.0	4.0
4) The number of ornamental horticulture operations will increase	4.0	4.0
5) The number of small fruit and vegetable farms will increase	4.0	4.0
ANIMAL PRODUCTION TECHNOLOGY:		
6) Higher production will occur with existing breeds of animals	5.0	4.0
7) Increased production and disease resistance will be genetically transmitted in animals	4.0	4.0
8) Leaner meats that convert less nutrients to fat will be produced	4.0	4.0
9) The number of livestock farms (beef, goats, sheep,...except dairy) will increase	4.0	4.0
MARKETING:		
10) The quality of Vermont agricultural/forestry products will allow producers to have a competitive advantage in the marketplace	4.0	4.0
11) Vermont producers will tailor production to specialized markets	4.0	4.0
12) Fewer wholesale food and fiber processing and manufacturing firms will account for a greater proportion of the market	4.0	3.0
13) Specialized agricultural/forestry products will command a premium price in the marketplace	4.0	4.0
AGRICULTURAL MACHINES & EQUIPMENT:		
14) An increasing use of electronics in agricultural/forestry equipment and machinery will occur	4.0	4.0
15) An increasing use of computer engine controls in agricultural/forestry machinery will occur	4.0	3.0
16) Maintenance of agricultural/forestry machines will require a high level of electronic skills	4.0	4.0
17) Hydraulic devices will be more widely used in agricultural/forestry machinery	4.0	3.0
BUSINESS MANAGEMENT:		
18) Agricultural property will continue to be assessed at a reduced rate	4.5	4.0
19) Computer technology will be widely used to manage agricultural/forestry operations	4.0	4.0
20) Telecommunications networks will be used to access central databases concerning information on weather, computer software, and markets	4.0	4.0
21) Private consultants will play a larger role in farm management	4.0	4.0
FORESTRY:		
22) The tourist industry will cooperate with the agricultural/forestry industry to promote Vermont products	4.0	4.0
23) There will continue to be reduced tax on timber lands	4.0	4.0
24) The state will continue to become more forested	4.0	3.0
25) The number of producers of Christmas trees will increase	4.0	3.5
26) The number of maple syrup producers will increase	4.0	3.0
27) The number of consulting foresters and technicians will increase	4.0	3.0

Table 2. New Knowledge and Skills Grouped by Agricultural Area.

Knowledge and Skills

PLANT PRODUCTION TECHNOLOGY

1. Propagate plants by tissue culture
2. Select genetic cultivars based on the following characteristics:
   a) insect and disease resistance
   b) market quality
   c) adaptability to environmental constraints
3. Evaluate new cultivars through test plots
4. Grow open pollinated seeds
5. Use improved soil and tissue analysis
6. Use growing season extenders
7. Apply a sustainable systems approach to plant production
8. Evaluate innovative techniques to store harvested crops (e.g. irradiation)

ANIMAL PRODUCTION TECHNOLOGY

1. Select and manage the following new technologies:
   a) Bovine Growth Hormone
   b) Embryo Transfer
   c) Monoclonal Antibodies
   d) Assess body composition of live animals
2. Select for disease resistant strains of livestock.
3. Practice management strategies to produce leaner meats.

MARKETING

1. Evaluate and use innovative marketing techniques:
   a) segmenting markets
   b) market niches
   c) collective marketing
   d) subscription marketing
   e) contract marketing with retail outlets
   f) product image e.g. Vermont mystique
   g) specialized products e.g. organically grown
2. Establish and manage marketing cooperatives
3. Market products regionally
4. Develop a quality control program

AGRICULTURAL MACHINES & EQUIPMENT

1. Operate machine and equipment with electronic devices e.g. tractors, irrigation equipment, cultivators.
2. Trouble-shoot electronic switches, sensors, and circuitry.
3. Operate and maintain hydraulic devices.

BUSINESS MANAGEMENT

1. Use land trusts to acquire land
2. Access large computer databases
3. Use telemarketing and teleauctions
4. Evaluate the use of agricultural/forestry consultants
5. Evaluate social, environmental, and economic implications of the new technologies.
6. Plan and manage an integrated production system.
7. Use problem-solving techniques.
8. Integrate Federal and State rules and regulations concerning new technologies.
9. Use computerized price and product information
10. Develop self-employment skills that include:
    a) Orientation to change
    b) Self-confidence
    c) Risk taking
    d) Personal commitment
    e) Political maturity

FORESTRY

1. Explore innovative links between tourist and agriculture/forestry operations.
2. Grow alternative crops on forest land.
3. Operate and maintain reverse osmosis equipment.

Business Management

There was a strong need for new knowledge and skills in business management as exemplified by the 15 items listed in our results. Agriculturalists need to utilize computer technology, interpret government rules and regulations concerning new technology, make management decisions based on the implications of that technology, and develop self-employment skills such as risk taking and political maturity.

Forestry

The results from the panel indicate three new forestry knowledge and skills areas. These areas are exploring links between the forestry and tourist industries, growing alternative crops on forest land, and operating and maintaining reverse osmosis equipment.

CONCLUSIONS

The expected future trends and events with the highest likelihood of occurrence and educational impact in Vermont reveals an agricultural industry that will continue to be shaped by new technological innovations in production, propagation, breeding, insect and disease control, mechanics, computers, and communication technology. However, the adoption of new technologies will be tempered by prowess with marketing and business management skills. Part-time farmers will increasingly have to develop and adapt marketing and management techniques to a changing economy and environment.

The emphasis on the expected importance of business management and marketing was reiterated by the technical panel as they developed the new knowledge and skills needed by individuals preparing for or engaged in part-time agriculture for the 1990's. Their list of 46 knowledge and skills includes the application of technological advances along with renewed applications and innovative adaptation of existing business and marketing competencies.

RECOMMENDATIONS

Studies are needed to identify (1) the role for vocational education in agriculture in response to the needs of part-time/small scale agriculture and (2) discrepancies between competencies currently being taught and those expected to become important in the future.

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FORECASTING EMERGING KNOWLEDGE AND SKILLS FOR PART-TIME AGRICULTURE

A Critique

John Hillison, Virginia Tech -- Discussant

This paper begins with a theoretical base that emphasizes the state for the data collection - Vermont. The purpose and objectives of the study are well stated and were accomplished.

The procedures included a recognized method for opinion collection, the Delphi technique. I applaud the efforts and the ambition of researchers who used a peer nomination process with 945 potential subjects identified and 100 actually used. Sound follow-up procedures were used to determine the opinions of non-respondents.

The statistical analysis was appropriate for the data collected. Conservative and safe procedures such as using the median as a measure of central tendency pervaded the work. The results all appeared to make sense with conclusions and recommendations closely based upon the findings.

While the theoretical base was appropriate for this specific topic, it was quite brief. One part of the theoretical base included a definition of small scale/part-time farming. Why was such a definition used when the study was clearly on part-time agriculture when this term was not defined?

The peer nomination process appears to be an effective way to purposefully select experts to look at future trends. Questions remain as to who started the process - who was asked to nominate peers? With a total of 945 subjects nominated by peers, why was the sample narrowed to 100? What was the basis for this number? While admiring the ambition of researchers who are willing to use a Delphi with such a large sample, I am also aware of the fact that many experts recommend a smaller number more like 25 to 35 for the Delphi sample. This smaller sample size would be permitted to make comments on suggested changes. Such a technique would appear to have merit, especially when expert opinion is desired.

Another advantage of a smaller sample size is the possibility of recognizing the five additional statements added by the expert subjects in round one. This may have required a third round of Delphi, but total resources expended for three rounds with a sample of 35 would be less than two rounds with a sample of 100.

While 72% and 67% response rates are generally considered acceptable, an even higher response rate was certainly possible. What incentives were used to get the response rate as high as possible? A smaller sample would have permitted the researchers more time and required fewer resources to encourage a higher response rate. While applauding the efforts to follow-up non-respondents, it is still best to put efforts into receiving the highest possible response rate.

Overall, my compliments to the researchers on a good study. The topic was a timely one and has implications for Agricultural Education. When given the option they chose a conservative route that stands the test of logic and sound research. My main suggestions were to work a little less harder and still have a good study.

HOW DO THEY COMPARE? THE OPINIONS OF VOCATIONAL AGRICULTURE TEACHERS TOWARD STATE SUPERVISION AND TEACHER EDUCATION IN AGRICULTURE

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INTRODUCTION

"Where there is much desire to learn, there of necessity will be much arguing, much writing, many opinions; for opinion in good men is but knowledge in the making."

-John Milton (1608 - 1674)

State supervisors and teacher educators are regularly called upon to evaluate vocational agriculture teachers in the field. However, other than requests by state or university advisory committees, they are rarely asked to offer their opinions on the performance of state supervisors and teacher educators.

Except for two recent studies which used the opinions of state and national officers of vocational agriculture teachers' associations for evaluation purposes, research in this area is limited (Kotrlik and Lelle, 1986). Even when the review of literature is broadened to include all of education, few examples exist of formal evaluation of teacher education or state supervision programs where teachers were the primary evaluators (Creaser. 1972).

As McCormick (1985) stated in a recent article, the opinions of vocational agriculture teachers are a valuable tool to use in assessing the general state of teacher education in agriculture. Sadler (1985) believes that, although opinion surveys do not provide penetrating critical insights into policy and the manner in which policy finds expression, they do provide the strongest base for generalization when used in evaluation. Creaser (1972) and Conant (1963) also suggest using teachers to evaluate teacher education programs.

After a review of related literature, the authors determined that vocational agriculture teachers' opinions represented one way to comparatively evaluate the performance of state supervisors and teacher educators. Despite responsibilities in such diverse areas as teacher preparation, research, and management of the state FFA program, state supervision and teacher education share many common responsibilities (Lelle, 1984). The primary purpose of this study was to determine vocational agriculture teachers' opinions of the performance of state supervisors and teacher educators in these shared areas of responsibility.

OBJECTIVES OF THE STUDY

1. To determine vocational agriculture teachers' opinions of state supervision and teacher education in agriculture in the United States.

2. To determine if differences existed in the perceptions of teachers toward selected aspects of state supervision and teacher education according to the levels of the demographic variables. Twelve demographic variables were used in this analysis:

   a. Age
   b. Sex
   c. Years of vocational agriculture teaching experience
   d. Educational level
   e. Years of vocational agriculture the teacher completed in high school
   f. Length of teaching contract
   g. Population of the area in which the teacher's school was located
   h. Primary taxonomy of the vocational agriculture program
   i. Number of vocational agriculture teachers in the school
   j. Number of visits by university agricultural education faculty in the last five years
   k. Number of visits by state department agricultural education staff in the last five years
   l. Status as a past or present officer in a state or national vocational agriculture teachers' association.

3. To determine the teachers' ranking of actions needed to improve teacher education and state supervision in agriculture.

PROCEDURES

The population ($\underline{N}$ = 12,464) consisted of teachers of vocational agriculture who were teaching in ninth grade programs, senior high school programs, or secondary joint vocational agriculture programs at the time of the study. The sample was drawn from the 1984 Agriculture Teachers Directory (Henry, 1984).

Cochran's sample size formula (Snedecor and Cochran, 1980) indicated that a minimum of 173 returned questionnaires was needed. A sample size of 245 was used in the study in anticipation of a response rate as low as 70 percent. After the sample size was determined, each eligible teacher from the 1984-85 Agriculture Teachers Directory was numbered, and a table of random numbers was utilized to select the completely random sample.

A closed-form questionnaire developed during an earlier study by Kotrlik and Lelle (1986) was used to secure the information needed to satisfy the objectives of the study. Changes indicated from their study were incorporated into the instrument. In addition, the updated instrument was field tested using 12 teachers of vocational agriculture from several areas of the United States. The final instrument used in this study yielded the following reliability estimates using Cronbach's Alpha:

State supervision scale: $\alpha = .88$
Teacher education scale: $\alpha = .89$

After three mailings and a telephone follow-up, a response of 177 out of 245 (72.2 percent) was achieved. This exceeded the minimum requirement of 173 returned questionnaires.

Oral responses to the entire instrument were requested by the author during the telephone follow-up. Analyses of variance were used to compare the responses from the four response waves (three mailings and one telephone follow-up). The comparisons did not yield any differences and the responses from the four group were combined for data analysis.

The data were analyzed using descriptive statistics and inferential t-tests. The level was established a priori at .01 to minimize the problems associated with multiple t-tests,

RESULTS

The scale used in the instrument was a reverse Likert Scale, with one being excellent and five being poor. On the seven state supervision Likert Scale items, the statement which received the most desirable rating was, "Quality of working relationship with teachers." The statement with the least desirable rating was, "Efforts to help teachers improve their teaching." The teacher education statement which received the most desirable rating was, "Quality of working relationship with teachers," while the statement with the least desirable rating was, "Opportunity for teachers to have input in agricultural education policies."

Student t-tests were used to determine if differences existed between the ratings assigned to state supervisors and teacher educators. The only significant difference between individual statements was on item five, "Opportunity for teachers to have input in agricultural education policies." State supervisors received a 2.27 mean rating (just below good) while teacher educators scored a 2.78 mean rating (just above fair). These data are listed in Table 1.

The grand mean rating given to state supervisors (2.07) was significantly better than the rating given to teacher educators (2.21). It should be noted that the grand mean was not intended to evaluate the total state supervision and teacher education program, but only a composite of those seven aspects addressed in this study. These data are also listed in Table 1.

Place Table 1 about here

The vocational agriculture teachers were also asked to rank, from one to seven, actions that state supervisors and teachers educators needed to take to improve vocational agriculture programs. Teachers believe that both state supervisors and teacher educators need more money to conduct activities, and that more workshops need to be conducted by both groups. Similarities between the two groups become less apparent or cease to exist after these two item rankings. These data are listed in Table 2.

Place Table 2 about here

CONCLUSIONS AND RECOMMENDATIONS

1. Teachers' opinions of teacher education and state supervision did not vary according to age, sex, years teaching experience, education, years of vocational agriculture in high school, length of teaching contract, school location, program type, number of teachers in the program, number of visits by teacher educators, number of visits by state supervisors, or status as a vocational agriculture teachers' association officer.

2. Teachers perceived that state supervisors were doing a better job of conducting the specific responsibilities addressed in this study than were teacher educators, and that teachers had less input in teacher education policies than in state supervision policies. Teacher educators should evaluate their responsibilities in the areas addressed by this study to determine why this perception exists.

3. Teachers believed that more money for state supervision and teacher education activities and more workshops for teachers would result in the greatest improvement in state supervision and teacher education programs. Although acquiring more money might be beyond state supervisors' or teacher educators' control, providing more workshops may be possible. State supervisors and teacher educators should determine if a need exists for more in-service education and workshops in their respective states.

4. Based upon a review of appropriate literature and the findings of this study, further evaluation of state supervision and teacher education should be conducted to determine what changes, if any, are needed in these two components of agricultural education. Vocational agriculture teachers should be included in these evaluative efforts.

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Table 1

Ratings Assigned to Statements About State Department of Education Supervisors and University Faculty

Statement		State supervisors	Teacher educators	df	t
1. Usefulness of workshops offered	m sd	2.05 .80	2.01 .79	150	.56
2. Representation of agricultural education to those outside the profession	m sd	2.04 .91	2.20 .85	169	-2.18
3. Quality of working relationship with teachers	m sd	1.90 .78	2.00 .85	172	-1.54
4. Quality of communications with teachers	m sd	2.06 .93	2.12 .84	170	-.87
5. Opportunity for teachers to have input in agricultural education policies	m sd	2.27 .88	2.78 .87	169	-7.32*
6. Efforts to help teachers improve their teaching	m sd	2.33 .93	2.38 .91	171	-.75
7. Efforts to help teachers get up to date information	m sd	2.22 .98	2.35 .95	171	-1.67
Grand mean	m sd	2.07 .64	2.21 .67	143	2.81*

Note. 1 = Excellent, 2 = Good, 3 = Fair, 4 = Poor, and 5 = Unacceptable

*p < .01

Table 2

Ranking of Efforts Which Would Result in Improved Programs

Effort	State staff		Faculty	
	Mean	Rank	Mean	Rank
1. More money for activities	2.91	1	3.60	2
2. More staff or faculty	4.15	4	4.69	6
3. More support staff	4.30	6	4.86	7
4. More teacher visits	4.35	7	4.25	5
5. More workshops	3.95	2	3.23	1
6. Better communications	4.16	5	3.55	3
7. More input from teachers	4.12	3	3.84	4

HOW DO THEY COMPARE? THE OPINIONS OF VOCATIONAL AGRICULTURE TEACHERS TOWARD STATE SUPERVISORS AND TEACHER EDUCATORS IN AGRICULTURE

A Critique

Larry E. Miller, The Ohio State University -- Discussant

I would grant that teacher educators and supervisors do not systematically collect information very often from the teachers they serve. Teacher educators are probably required to do so more often than supervisors as they undergo departmental self-studies and are required to accumulate information from a diverse set of individuals.

The authors conducted survey research and addressed most of the threats to such research in their paper. To mention these threats and how they were controlled is very appropriate.

Some of the concerns which I have are:

The logic the authors used for determining the sample size of 173 was based upon the number of returns needed. The logic does not flow that way, even in the Snedecor and Cochran (1980) reference. From a target population, one selects a sample size appropriate for a given level of confidence and risk. The sample selected, if drawn appropriately, is representative of the target population at that level of confidence. One could draw twice the number needed and improve the confidence level to help control sampling error. However, this has nothing to do with non-response error. Non-response error is a bias that occurs when the respondents are not representative of the sample. Doubling the sample size might only give one twice the the number of biased respondents, and the data would still be questionable. The authors' follow-up techniques may have been an attempt to control this, but they did not make clear what characteristics were the basis of comparison. For a discussion on the control of non-response error, see Miller & Smith, Journal of Extension, 21, September/October, 1983.

In looking at measurement error, what was the validity of the items for assessing the domain of interest? No evidence is presented, I question its face validity, and therein lies what I consider to be a major weakness of the study.

What is a "reverse Likert Scale?" How does setting an alpha level at .01 help control comparison-wise error rates? According to my calculations, the real alpha, for seven comparisons, is .47, which implies that up to one-half of the items could have been significant due to chance. Since they report one item significant, was it due to chance? Where did the authors address their second objective? Isn't internal consistency reliability for establishing domains, and wouldn't test-retest be more appropriate for this study?

I do not see data to support Conclusion #1. "...improvement in state supervision and teacher education program" is noted but page 3 asks about improving vocational agriculture, and the disparate nature of the item ranked leaves a general question of what was evaluated -- was the questionnaire valid? I would suggest that more thorough studies be conducted related to these objectives. Such studies should not only look at teachers, but those preparing to be teachers who did not teach and those who taught and then quit the profession.

IDENTIFICATION OF SCIENCE-RELATED COMPETENCIES TAUGHT IN VOCATIONAL AGRICULTURE PROGRAMS

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INTRODUCTION

In recent years, considerable attention has focused upon improvement of student competence in the field of science at the secondary school level. Many states have mandated revisions in the high school curricula so as to increase the required number of science credits needed for graduation. Typically, these revisions have meant that high school students would enroll in additional science courses such as general science, biology or chemistry.

In the past, little consideration has been given to the potential for teaching science competencies in other than traditional science courses. The Association for Supervision and Curriculum Development (ASCD, 1985) reports that as a result of new academic credit requirements, students merely "take more of the usual courses in the traditional subjects." The report further charges that, "Most states have neither sought to identify the content of additional courses, nor have they generally appropriated new dollars to upgrade curriculum and instruction." The concluding result is that the approximately 24 percent of students who choose to enter the work force after graduation may be harmed by the new requirements (AVA, 1985).

As the number of required courses has increased, the number of elective courses available to the student has simultaneously decreased. In most cases, vocational education courses are considered as elective courses. Consequently, enrollments in vocational education have decreased as the number of required high school courses has increased. Dyrenfurth (1985) conducted a national survey of high school graduation requirements and concluded,

> In state after state, the number of 'basic' courses required for graduation is being increased. The variable result is a single-focus curriculum that gravely underserves students, for they will have little or no time left in their secondary school years to take practical arts and vocational subjects (p. 43).

However, some states are examining vocational education courses such as vocational agriculture for use as a means of teaching science competencies to high school students. In a limited number of states, students completing a sequence of vocational courses are allowed to substitute those courses for required science credit. A survey conducted in 1985 by the Delaware Department of Public Instruction shows that eleven states had policies which allowed vocational credit to be counted in lieu of science or math, sixteen states gave local school districts the authority over course credit approval, and three states had a policy that prohibited allowing vocational credit as a substitute for mathematics, science or any required subjects (Stewart, 1985).

Only two references are made specifically to vocational agriculture in the 1985 Delaware study. In Oklahoma, the State Board of Education adopted a policy which allows a school to waive a unit of credit in mathematics and a unit of credit in science providing a student completes six units of credit in vocational agriculture. In Virginia, a state policy allows for completion of a sequence of courses for occupational preparation in agriculture as an alternative to the requirement of a math or science course in the diploma program.

Since 1985, several states (Illinois, Missouri, North Carolina, Texas) have initiated studies of the relationship between science competencies taught in traditional science courses and competencies taught in vocational agriculture. The studies report that a substantial overlap exists between science competencies and agricultural competencies or objectives. For example, Briers conducted a study to determine the extent to which vocational agriculture in Texas provided opportunities for students to develop concepts and skills in mathematics and science. Seventy-five percent of the topics taught in vocational agriculture were judged by a panel of science teachers as developing concepts and skills in science.

The study by Briers supports the popular belief held by many in the profession that vocational agriculture is heavily laden with science-related instruction. However, care should be exercised in making broad generalizations for all of vocational agriculture based upon the findings of a limited number of studies. Thus, this study was conducted to determine the extent of science-related instruction in vocational agriculture in Louisiana. The study is of value to educators in other states as a model for examining the relationship between state-approved science courses and vocational agriculture.

PURPOSE AND OBJECTIVES

The purpose of the study was to determine the extent to which science-related instruction occurs as a part of instruction in vocational agriculture. In order to achieve this purpose two objectives served as guidelines in the performance of the project.

1. To identify instructional objectives in the Basic Program of Vocational Agriculture in Louisiana which were similar to competencies taught in state-approved science courses.

2. To determine the amount of time spent in vocational agriculture programs in Louisiana on science-related vocational agriculture instruction.

PROCEDURE

To accomplish the objectives previously outlined, the basic curriculum guide for agriculture and the competency outlines for science were examined to identify possible objectives in agriculture that were science-related. The state-adopted curricula for the high school science courses, biology, chemistry, earth science, environmental science, general science, physics, and physical science, were used as the source for identifying the competencies taught in high school science programs.

The Basic Program of Vocational Agriculture in Louisiana (Bulletin 1690, Vols. I, II, III) was used as the source for identifying agricultural objectives taught in Louisiana vocational agriculture programs. This curriculum guide is used in all programs throughout the state. This basic program of studies, also referred to as Vocational Agriculture I and Vocational Agriculture II, is the foundation for more specialized training at the 11th and 12th grade levels. Major emphasis at the 9th and 10th grade levels is placed on agricultural sciences, leadership and exploratory work experiences in agricultural production and agribusiness occupations.

Two groups of knowledgeable personnel assisted in the identification of the science-related objectives. Input from a random sample of Louisiana vocational agriculture teachers was sought to determine science-related instructional objectives and time spent on science-related instruction. Two-hundred sixty eight vocational agriculture teachers comprised the population from which the research sample was drawn. A sample size of 158 was determined using the formula for calculating the sample size needed when the size of the population is known and the response measure dichotomous as discussed in Educational and Psychological Measurement by Krejcie and Morgan (1970). The formula was calculated using a 95% confidence level for the table value of chi-square and 0.05 as the degree of accuracy expressed as a proportion.

A select sample of 15 Louisiana science teachers was asked to verify the appropriateness of the objectives identified as science-related by the vocational agriculture teachers. The science teachers were knowledgeable of vocational agriculture and served to further validate the objectives as being science-related.

A survey instrument was developed, validated, field tested, and sent to the sample of vocational agriculture teachers. The teachers were asked to determine if the listed objectives were science-related and to indicate the amount of time spent teaching the objectives. After the instructional objectives were identified, a second instrument showing the relationship between the agricultural objectives and science competencies was sent to the sample of high school science teachers for validation of the similarity of the objectives.

RESULTS

Usable information was obtained from 112 respondents or 71% of the sample. Five (10%) of the nonrespondencs were contacted by phone and administered the questionnaire. The data collected indicated no bias existed in the non respondents.

A total of 76 instructional objectives from the Basic Program of Vocational Agriculture in Louisiana curriculum guide were identified as being science-related. The greatest similarity between the curricula in vocational agriculture and a specific high school science course is in Environmental Science. Fifty-four agricultural objectives were of similar content to the objectives taught in environmental sciences. It was also found that 20 of the 76 objectives overlapped with two or more science courses. The science-related agriculture objectives identified in the study are shown in Tables 1 and 2.

To further document the teaching of these science-related instructional objectives, the vocational agriculture teachers indicated the amount of instructional time spent in teaching the objectives. A summary of the allocated instructional time as established in the document, Vocational Agriculture/Agribusiness Program Planning (Bulletin No. 1570) is shown in Table 3. Average hours of science-related instruction as reported by the teachers and percentage of allocated hours is also shown in Table 3.

The greatest percentage of allocated hours spent in science-related instruction is in the instructional area of soil science. In both cases, these figures are greater than the allocated hours suggested by the State Department of Education. In other words, it takes longer to teach the soil science instructional area than is suggested by state guidelines. Two instructional areas, career information and agricultural leadership, were perceived by the teachers as containing no competencies that were science-related. Overall, the teachers reported that approximately one-third (32%), Vo-Ag I; 35%, Vo-Ag II) of the instructional time spent in teaching vocational agriculture in Louisiana is spent on science-related instruction. Implications of these findings for vocational agriculture programs in Louisiana are discussed in the conclusions and recommendations that follow.

Table 1
Agricultural Objectives in the Basic Program of Vocational Agriculture Overlapping with Competencies Taught in Biology, General Science, and Physical Science.

Biology	General Science	Physical Science	AGRICULTURAL INSTRUCTIONAL OBJECTIVES
*			Define new plant science terms.
*			List the parts of the plant and identify their functions.
*			Describe the history of crop improvement.
*			Identify causes of disease.
*			Identify by name the various parts of livestock and poultry.
*			Identify by locations the various parts of livestock and poultry.
*			List the six classes of nutrients.
*			Identify the function of nutrients.
*			Outline the classification and nomenclature of feedstuffs.
*			Identify the sources of feedstuffs representing essential elements.
*	*		Label and define essential parts of the digestive system.
*	*		List the anatomy and functions for the male and female.
*	*		Describe the reproductive process for mammals and poultry.
	*	*	Define electrical terms.
		*	Name the two basic types of circuits.
		*	Identify the types of conductors and insulators.

Table 2

Agricultural Objectives in the Basic Program of Vocational Agriculture in Louisiana Overlapping with Competencies Taught in Earth Science, Environmental Science, Chemistry and Physics.

Earth Science	Environmental Science	Chemistry	Physics	
*	*			Define soil.
*	*			Distinguish between surface soil and subsoil.
*	*			Identify the six main soil areas in Louisiana.
*	*			Describe a soil profile.
*	*			Identify the various soil horizons in a soil profile.
*	*			Describe soil formation.
*	*			List the factors responsible for soil formation.
*	*			Name the factors of most influence on soil formation.
*			*	Demonstrate the water holding capacities of soils.
*			*	Determine soil water availability.
*			*	List the ways available water can be lost by soils.
*			*	Name factors important in determining water movement in soil.
	*	*		Make chart of pH scale to show acidity and alkalinity.
		*		Make laboratory tests for acidity of common products.
	*	*		Explain how calcium affects soil acidity and availability of elements.
		*		Explain how pH symbols are used in denoting acidity/alkalinity.
	*	*		Describe the conditions that lead to soil acidity/alkalinity.
	*	*		List the pH ranges of the major crops.
	*			Explain where energy comes from to carry out nitrogen transformations.
	*			Name one type of bacteria involved in the nitrogen cycles.
	*			Discuss the symbiotic relationship between bacteria and plants.
	*			Specify where the bacteria are located in the root of plants.
	*			Discuss nitrogen fixation.
	*			Describe components of plant's underground environment.
	*			Describe components of plant's above ground environment.
	*			List the optimum growth conditions for different plants.
	*			Explain how plants obtain carbon, oxygen, hydrogen, and nitrogen.
	*			Describe the nitrogen cycle.
	*			List some sources of inorganic fertilizers.

Table 2 continued

Earth Science	Environmental Science	Chemistry	Physics	
	*			List some sources of organic fertilizers.
	*			Identify reasons for using chemicals safely.
	*			List ways chemicals can harm the environment.
	*			List ways chemicals move through the environment.
	*			Define residues.
	*			Define tolerances.
	*			List chemical and biological properties of soils.
	*			Explain how chemical or biological properties affect nature of soil.
	*			Name the microorganisms found in soil.
	*			List soil microorganisms that are beneficial to farmers.
	*			Describe the role of higher forms of plant and animal life in soil.
	*			Interpret organic matter content of surface soil using soil color.
	*			Interpret internal drainage of subsoil by observing soil color.
	*			Distinguish between "light" and "heavy" soils.
	*			Determine the texture of a soil sample.
	*			Classify a soil sample using the textural triangle.
	*			Explain the effects of soil structure on productivity.
	*			State the management practices to obtain proper soil conservation.
	*			Determine best possible use of land according to soil factors.
	*			List the farming types found in Louisiana and the U.S.
	*			State approximate acreage for producing different crops.
	*			Identify the three primary elements and functions in plant growth.
	*			Compare advantages and disadvantages of fertilizers.
	*			Identify different conditions of plant when fertilizer is lacking.
	*			Identify harmful insects and describe destructiveness.
	*			List and discuss the reasons weeds are harmful.
	*			Recognize and describe the symptoms and effects of plant diseases.
	*			List signs of ill health and identify causes of disease (Ansc.).
	*			Identify safety precautions when applying herbicides.
	*			List general precautions for mixing herbicides.
	*			List characteristics of major groups of insecticides by chemical makeup.

Table 3

Allocated Instructional Time and Science-Related Instructional Time by Subject Matter Areas for the Basic Program of Vocational Agriculture in Louisiana

Instructional Area	Vocational Agriculture I			Vocational Agriculture II		
	Hours of Allocated Instruction	Hours of Science-Related Instruction	Percent of Allocated Hours	Hours of Allocated Instruction	Hours of Science-Related Instruction	Percent of Allocated Hours
Soil Science	16	19	119%	15	16	106%
Plant Science	20	14	70%	17	10	59%
Animal Science	24	10	42%	15	10	67%
Agricultural Mechanics	29	4	14%	28	4	14%
Orientation to Vo-Ag	13	2	15%	10	0	0%
Career Information	6	0	0%	8	0	0%
Agricultural Leadership	28	0	0%	15	0	0%
Environmental Protection	-	-	-	6	4	67%
Energy Conservation	-	-	-	4	1	25%
Local Option[a]	34	6	18%	52	15	29%
TOTAL	170	55	32%	170	60	35%

[a] In addition to the instructional areas included in Vocational Agriculture I and II, additional hours are allocated to be used as a local option to better meet student and community needs.

CONCLUSIONS/RECOMMENDATIONS

The following conclusions and recommendations are made on the basis of this research study.

Conclusions

1. A substantial number of science-related instructional objectives are included in the Basic Program of Vocational Agriculture in Louisiana and are being taught in vocational agriculture programs.

2. The Basic Program of Vocational Agriculture in Louisiana contains science-related objectives in both levels of instruction, Vocational Agriculture I and Vocational Agriculture II, with instructional time spent on those objectives being approximately equal.

3. The Basic Program of Vocational Agriculture in Louisiana includes overlapping objectives with each of the state approved science courses with the most overlap occurring for the science course, Environmental Sciences.

4. The instructional area, soil science, of the Basic Program of Vocational Agriculture in Louisiana is where the greatest number of science-related competencies are found and where the greatest science-related instruction is occurring.

Recommendations

1. In this study only the basic curriculum (Vo-Ag I and II) was examined. A similar study should be conducted for the advanced curriculum (Vo-Ag III and IV).

2. Since a substantial number of agricultural objectives overlap with the state-approved science course, Environmental Science, substitute credit for completion of Vocational Agriculture I and II should be sought for this course.

3. Since the amount of time spent in science-related instruction as part of the local option is relatively low, teachers should be surveyed as to the content of the local option instruction and materials developed that emphasize science-relatedness where appropriate.

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IDENTIFICATION OF SCIENCE-RELATED COMPETENCIES TAUGHT IN VOCATIONAL AGRICULTURE PROGRAMS

A Critique

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Professor Moss has completed a piece of useful work. It is very timely. The policy makers are clamoring for such data which they can use for leverage in political decision making. This knowledge is also simply instrinsically interesting.

The introduction is well crafted and unusually clear. It shows the author's command of what is happening in his area of interest. Furthermore, he builds a clear set of logic for why this study was needed.

The objectives were likewise clear. After reading the procedures section, I could replicate the study. It was presented in a clear and understandable way. In addition, the results were easy to follow and they made sense.

In spite of these accolades, I feel compelled to raise some haunting questions of a philosophical nature. To me there is a more urgent question with which the profession must deal. Is the science content of vocational agriculture the science which is demanded of modern agriculturists? Is it the right science? If we become overly concerned with adding up whatever is there so as to increase "our numbers," we will have made an unfortunate decision. We will fail to pursue the truth that is desperately needed for the real improvement of agricultural education.

There is a second major question. Do bits and pieces of "stuff" (science competencies) add up to anything that matters? Do "x" competencies in earth science, "y" competencies in chemistry, and "z" competencies in physics, when taken together in a fragmentary way, add up to any knowledge base of use to one in the twenty-first century? The urgency of the question is redoubled if these "bits and pieces" of science are surface, introductory, and at a low level of understanding. The analysis presented in this study suggests that is in fact the case.

Without a discussion section in this paper, the conclusions as recommendations are too perfunctory.

It is important that this work not stop here. As the inquiry continues, there needs to be more known about what students actually learned than what was covered. Similarly, to know how much time was spent on a competency is one thing, to know how the time was spent is even more intriguing and useful.

This is an area of scholarship worth our most careful attention. I hope those interested in this topical area will band together to allow progress on developing answers to the searching questions which continued study of this kind raises.

IMPACT OF FEDERAL DEVELOPMENT PROGRAMS ON AGRICULTURAL PRODUCTION UNDER MONITORED EDUCATIONAL AND TECHNOLOGICAL CONDITIONS WITHIN THE EJIDO SYSTEM IN CHIHUAHUA, MEXICO

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INTRODUCTION

Mexico, as a country deeply concerned and strongly committed to its development potentials is trying to design and implement alternative strategies to stimulate modernization through the introduction of desirable changes and innovations among its rural population. The undertaking has been tremendous and the results, though somewhat successful, have fallen considerably short of the original goal. The explanation to the relative lack of success of the federal efforts in the promotion of agricultural development is to be sought in a variety of factors. These factors include; political oriented development programs, limited development of extension services, and limited studies and research based evidence on the dispositions and conditions of the rural population. The above factors have generated confusion and the need for further research studies attempting to explain and clarify agricultural phenomena as they might be related to rural productivity and progress.

Gomez (1969), Cortez (1976), Ortiz (1978), and Padilla (1979), have concluded that the social, educational, and technological changes required to promote a significant level of improvement among the rural population have not been fully understood, analyzed, and incorporated into the modernization strategies. According to these authors, the major problem areas of the Mexican efforts to stimulate agricultural development could be summarized as follows: (1) The inefficiency of previous strategies to introduce the desired changes, along with the inability of the change agencies to provide for sound alternatives to correct observed weaknesses in implemented plans and policies, and (2) The reduced funds to promote agricultural development at the desired pace.

As evidenced by previous research studies, the Ejido system* plays a very important role in rural Mexico as a major output of the Mexican agrarian reform. In this regard, the state of Chihuahua which borders the United States (southwest of Texas and New Mexico), has a large rural population, the majority of whom live in Ejidos (communities). Nearly sixty percent of the ejidatarios (farmers) in rural Chihuahua live and work in Ejidos under a wide variety of production as well as technological backgrounds. Under the Ejido system, the land cannot be sold, rented, or abandoned. These restrictions along with the ejidatarios' isolation and limited access to new production methods have resulted in low production rates and living conditions among the ejido population. Thus, if we accept the idea that the challenge is to design and implement studies attempting to explain complex phenomena in agriculture, then the analysis of the federal development efforts under monitored educational and technological conditions in the Ejido system would be a necessary stage, both to design and implement better oriented strategies and programs for improvement.

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*Ejido system: It refers to a land reform program mandated by the Mexican constitution in which parcels of land were distributed among the landless people to increase agricultural production.

PURPOSE AND OBJECTIVES

Within the context of the Mexican crisis and development problems in the Ejido system, this study attempted to evaluate selected characteristics related to the delivery of federal development programs under monitored educational and technological conditions as a means to explain their relative impact on agricultural production measured in terms of annual farm income. The evidence of the study will be also used to identify predictable situations in which the delivery of federal development programs could be of greater value for change agents and agencies in the state of Chihuahua.

The objectives of the study were the following:

1. To evaluate the influence of the ejidatario's (farmer's) educational status on agricultural production.
2. To determine the ejidatario's (farmer's) technological status as measured by the use of agricultural innovations and its relationship to agricultural production.
3. To determine the impact of federal development programs on agricultural production in the Ejido system.
4. To propose research based models for future studies on the development potentials in the Ejido system.

PROCEDURES

Population and Sample

The target population consisted of ejidatarios (farmers) residing in Ejidos (communities) in the state of Chihuahua, Mexico at the time of data collection (January 1984-May 1985). The state of Chihuahua is comprised of 286 ejidos or communities and the population in those ejidos was estimated to be over ten thousand ejidatarios and their families. The heterogeneous conditions in terms of production activities and levels of development among the population within the Ejido system in the state of Chihuahua were the main factors to consider for the use of a two stage random sampling approach. Thus, the population instead of a homogeneous mass, was composed of layers (strata) of discretely different types of units or ejidos, though the strata were somewhat equal in number. A ten percent random sample of the ejidos within each stratum was selected given the homogeneous number of ejidos among the strata. The second stage sampling approach was considered because of the differences in community size among the strata. Thus, a ten percent random sample of ejidatarios or farmers was selected in ejidos with 100 or more farmers; a twenty percent random sample was selected in communities with 51-99 ejidatarios; and a thirty percent random sample of ejidatarios was drawn in communities with 20 to 49 farmers.

The strata for this study were classified according to their particular characteristics as follows:

STRATUM 1. Ejidatarios in Modern Villages or Ejidos. These Ejidos are located in irrigation areas. Ejidatarios in modern villages have above average access to agricultural technology, credits and technical assistance. They have a specialized type of commercial oriented production which is totally traded (business oriented production and producers). These villages are usually located near to an important city.

STRATUM 2. Ejidatarios in Transition Villages or Ejidos. Ejidatarios within this strata have less access to technology, loans and educational opportunities than farmers in modern communities. Their production activities are less intensive and specialized. It is estimated that approximately twenty five percent of the total yield (cattle and/or crops) is left for family consumption.

STRATUM 3. Ejidatarios in subsistence villages or Ejidos. Ejidatarios in this type of community are not involved in commercial oriented production activities. They have very limited access to credits, technical assistance, and technology. Agricultural products are almost totally left for self-consumption.

STRATUM 4. Ejidatarios in isolated villages or Ejidos. Ejidatarios in these extremely poor communities are unable to produce enough food for their own families because of the extreme climate or because of their traditions as in the case of indian villages. Migration rates are the highest and hunger is not unusual.

Measurement Instrument

A three part measurement instrument was prepared to gather the information required for the study. Part one of the study was designed to collect information concerning the ejidatario's educational status as measured by; (a) the ejidatario's formal education, and (b) the ejidatario's educational aspirations. Data on agricultural production, change agent contact and cosmopolitanism were also obtained through this part of the instrument. Parts two and three of the instrument were Guttman type "unidimensional scales" which were developed to obtain quantitative measurements on the variables "federal development programs", and "use\adoption of agricultural production". The instruments were validated through the criterion validity by a group of experts from the National Council of Science and Technology (CONACYT) in Mexico, given that this study was financially supported by CONACYT and the University of Chihuahua. Reliability coefficients were calculated for each scale as follows:

Reproducibility coeff. = 1 - No. of errors / No. of responses*No. item choices

A coefficient of reproducibility of over ninety percent is considered to be sufficient to accept the hypothesis that a universe of qualitative items can be represented by a quantitative index derived from a scale score.

Based on the procedure above indicated, the scales of the study included the following items:

Federal Development Programs Scale: The ordering of the items was as follows:

Item A: Education
Item B: Health Care
Item C: Public Services (roads, transportation)
Item D: Rural Electrification
Item E: Community Development
Item F: Organization for Production
Item G: Technical Assistance
Item H: Credit and Insurance
Item I: Marketing
Item J: Conservation Programs

Estimated coefficient of reproducibility = .9532

Use\Adoption of Agricultural Innovations: The items on this scale were also selected and ordered by a number of farmers on a pilot sample. The final scale included the following items:

Item A: Fertilization
Item B: Vaccinations
Item C: Health Practices
Item D: Herbicides
Item E: Winter Feeding
Item F: Crop Rotation
Item G: Improved Seeds
Item H: Improved Breeds
Item I: Production Records
Item J: Mechanization

Reproducibility Coefficient = .92

Variables of the Study

Agricultural Production: (dependent variable) This variable was estimated from a series of questions prepared to evaluate the annual farm incomes of individual ejidatarios in the Ejido system.

Formal Education: Data on the ejidatario's formal schooling levels measured in terms of the maximun number of years attended to school.

Educational Aspirations: Discrete data on education reflecting strong desires of ejidatarios to achieve higher educational levels.

Change Agent Contact: Data on the ejidatario's contact with change agents in terms of number of visits per month.

Cosmopolitanism: Data on the ejidatario's trips to the cities on a monthly basis.

Federal Development Programs: Guttman score.

Use\Adoption of Agricultural Innovations: Guttman score.

Analysis of Data

Two major statistical approaches were used for data analysis: (1) descriptive methods as basic tools for data presentation, and (2) multiple regression analysis as a multivariate approach for model building and explanation purposes. A stepwise analysis with the MAXR option (SAS option for selecting variables on the basis of the coefficient of determination when using the multiple regression analysis) was selected for a thorough analysis of the impact of each variable in the model on the dependent variable.

The general model was:

$$Y = Bo + B1X1 + B2X2 + B3X3 + B4X4 + B5X5 + B6X6 + Ei$$

where:

Y = Agricultural Production (measured as annual farm income)

X1 = Educational Aspirations (levels of the variable)
  1. Professional or college
  2. Vocational-technical training
  3. Non agricultural skill
  4. Agricultural skill

X2 = Formal Education
  1. Number of years of formal schooling

X3 = Cosmopolitanism
  1. Number of trips to the city on a monthly basis

X4 = Change Agent Program
  1. Number of visits with change agents per month

X5 = Federal Development Programs
  1. Guttman score

X6 = Use\Adoption of Agricultural Innovations
  1. Guttman score

RESULTS

Descriptive Analysis

One particular aim of this study was to monitor educational and technological conditions as well as production levels and geographical movement of ejidatarios in the Mexican Ejido system. In this regard, observed production levels indicate that ejidatarios in modern communities had farm incomes averaging 378 thousand pesos. Ejidatarios in transition and subsistence communities had incomes of 127 and 85 thousand pesos, respectively. Ejidatarios in isolated ejidos had the lowest production levels averaging only 35 thousand pesos a year.

While the differences in annual farm income were those expected, the mean scores for use of agricultural innovations and access to federal development programs did not show a definite trend in favor of any of the four types of communities identified for the study. The levels of formal education appeared to be higher in more modern communities.

TABLE I
MEAN SCORE OF AGRICULTURAL PRODUCTION, FORMAL EDUCATION, FEDERAL DEVELOPMENT PROGRAMS, AND USE OF AGRICULTURAL INNOVATIONS WITHIN THE EJIDO SYSTEM IN CHIHUAHUA, MEXICO

Variable	Type of Community			
	Modern	Transition	Subsistence	Isolated
Agricultural Production (1)	377.3	126.1	84.6	35.0
Formal Education (2)	3.2	2.1	2.5	2.5
Federal Development Programs (3)	4.2	4.8	3.7	3.2
Use of Agricultural Innovations (4)	4.3	4.8	4.5	3.7

(1) Thousands of pesos
(2) Years of formal schooling
(3) Number of programs available to individual farmers
(4) Number of innovations adopted

Regression Analysis

Since one of the objectives of this study was to determine the influence of the ejidatario's educational status (formal education) on agricultural production, a simple straight-line regression model was used to obtain the relationship indexes needed to evaluate such influence. The results of the analysis for the four types of communities in the Ejido system are shown in table II. The calculated indexes indicated, that significant and positive relationships exist between the educational status of the farmer and his levels of agricultural production in all four types of communities within the ejido system. The influence of the educational status of ejidatarios on agricultural production appeared to be stronger in transition and subsistence communities since the observed significance levels were less than .01. The impact of the formal education variable on agricultural production in modern and isolated communities was significant at the .05 probability level.

TABLE II
REGRESSION STATISTICS FOR THE SINGLE REGRESSION MODEL INCLUDING THE VARIABLES, EDUCATIONAL STATUS (INDEPENDENT) AND AGRICULTURAL PRODUCTION (DEPENDENT) BY TYPE OF COMMUNITY

Type of Community	Intercept	Regression Coefficient	Standard Error	Observed Significance
Modern	293.48	26.1211	10.2312	.0126
Transition	99.08	12.4721	2.4701	.0001
Subsistence	60.09	9.7836	2.0838	.0001
Isolated	14.20	4.6418	1.8631	.0136

The results of the regression analysis of a number of selected independent variables on farm incomes within the Ejido system are shown in TABLE III.

TABLE III
AVERAGE AGRICULTURAL PRODUCTION, COEFFICIENT OF DETERMINATION AND PREDICTION EQUATIONS BY TYPE OF COMMUNITY

Type of Community	Average Income	R-Square %	Prediction Equation
Modern	378	7.6	E(Y)=293.4+26.1(X2)
Transition	127	8.9	E(Y)=59.0+11.2(X2)+4.1(X5)
Subsistence	85	12.2	E(Y)=35.7+.4(X2)+8.4(X1)+6.1(X5)
Isolated	35	9.0	E(Y)=24.7+7.2(X6)+5.4(X2)+2.7(X3)

MODEL: Y=Bo+B1X1+B2X2+B3X3+B4X4+B5X5+Ei

X1=Educational Aspirations
X2=Formal Education
X3= Cosmopolitanism
X4=Change Agent Contact
X5=Federal Development Programs
X6=Use of Agricultural Innovations

Results in TABLE III show that, in modern communities the magnitude of the change in the ejidatario's agricultural production for each unit of change in the ejidatario's formal education was estimated to be over 26 thousand pesos. Thus, formal education was the best predictor of farm incomes in this type of community. The variables, formal education and federal development programs helped to explain 8.9 percent of the variability of the dependent variable in transition communities. In subsistence communities, the combined educational variables showed to be of greater importance in explaining farm incomes. Finally, use of agricultural innovations, formal education, and cosmopolitanism were the best predictor variables in isolated communities.

CONCLUSIONS

1. The estimated indexes of annual farm income proved to be reliable indicators of agricultural production and documented the relatively low production levels in the Ejido system as compared

to other land tenure systems in rural Mexico. Although, the agricultural production rates in modern communities showed to be as high as the production levels of farmers outside the Ejido system, most of the ejidatarios are still producing under subsistence conditions and only few of them are in a process of changing and improving their potentials for increased production levels.

2. This study indicated that the use-adoption of selected agricultural practices as a measure of the ejidatario's innovativeness was low, as indicated by the Guttman scores on adoption of agricultural innovations. This confirmed the need for increased efforts in the diffusion of new and improved agricultural practices as an important step towards the modernization of agriculture in this important Land Tenure system.

3. In addressing the controversy of previous studies over the impact of educational variables on agricultural production, the most important finding of this study was that formal education measured in terms of years of formal schooling was identified as the most important independent variable in the promotion of better agricultural production levels in all types of communities. Furthermore, it must be concluded that any developmental program in the Ejido system needs to be based on sound educational strategies for the promotion of better standards of living.

4. The variable "federal development programs" was not a very good predictor variable by itself, from the standpoint of the amount of variance it accounted for in the dependent variable. Since the influence of selected federal programs on agricultural production was significant only in transition and subsistence communities, the Mexican government should implement different development programs for each type of community. The type of program to be implemented has to be designed in accordance with observed development potentials in each type of community. A recommended classification system for the communities in the Ejido system, as well as the type of development programs that are more likely to improve agricultural production, are to be found in this study.

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IMPACT OF FEDERAL DEVELOPMENT PROGRAMS ON AGRICULTURAL PRODUCTION UNDER MONITORED EDUCATIONAL AND TECHNOLOGICAL CONDITIONS WITHIN THE EJIDO SYSTEM IN CHIHUAHUA, MEXICO

A Critique

Jeffrey W. Moss, Louisiana State University -- Discussant

The topic of this research study is of extreme importance to the people of the state of Chihuahua, given the noted lack of success of prior development efforts in the region and the depressed condition of the ejidatarios residing in the 286 ejidos. The researchers are to be commended for undertaking such a study.

Strengths of the Research Paper. The introduction to the paper adequately describes the Ejido system of land reform in Mexico such that someone unfamiliar with the system can grasp the background conditions applicable to the study. The purpose was to evaluate characteristics of development programs as a means to explain their relative impact on agricultural production which is appropriate in terms of formulating recommendations for improved federal development programs.

Limitations of the Research Paper. The statement is made in the introduction that the restrictions of the ejido system and limited access to new production methods have resulted in low production rates. However, no citations or documentation is given to substantiate this claim. Since this premise is central to the purpose of the study, the paper could be improved by adding documentation for this critical factor.

The purpose of the study is sufficiently explained and the objectives support the purpose. However the description and results of the sampling procedure were vague. Two questions arise. What were the sample sizes after the two-stage process was completed? And, what rationale was employed in deciding to select the various percentages (10,20,30) in the second stage of sampling? Not including the sample sizes and the percentage of useable responses is a critical omission in the paper, particularly since no information is included in the results section on the number of cases included in the data analysis.

Part one of the measurement instrument is easily understood, however the reader would benefit by having additional information regarding the Guttman type scales used in parts two and three. A final suggestion for improving the procedures section of the paper is to include information on how the data were collected.

The use of multiple regression for model building is appropriate and the general model is adequate. In this study, the variable agricultural production is measured as annual farm income. Using income as a measure of productivity seems appropriate if farm sizes across the different strata are approximately equal. Is this the case, or is the difference in income reported in Table 1 due to size of farm? Prediction equations are displayed in Table 3 with explanations as to which factors are the best predictors of farm income. Even though the factors are statistically significant, I would ask the question, are they substantially significant given the low R-square values?

Conclusions in this paper have been drawn based on the total research project rather than the portion reported in this paper. While they are likely to be valid conclusions, they cannot be judged so based upon the data presented.

In summary, the research addresses a significant problem, however the paper lacks information of critical importance to its understanding by the reader.

LEVELS OF COGNITION OF TESTS AND ASSIGNMENTS IN AGRICULTURAL COURSES AT THE OHIO STATE UNIVERSITY

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INTRODUCTION

Instructors at all educational levels have been concerned with the actual kinds of learning taking place in their classrooms. Faculty in colleges of agriculture are no exception. They teach an enormous amount of subject matter in an area where knowledge is rapidly expanding. Many professors of agriculture concern themselves with what their students learn, but are less concerned with how and at what level of cognition it is being learned.

The types of questions being used to assess learning have been examined in terms of their relationship to student learning. At least ten classification systems were developed in the 1950's and 60's for categorizing questions as to which levels of cognition they were measuring (Ryan, 1973). One of those systems, The Taxonomy of Educational Objectives Handbook I: Cognitive Domain (Bloom, Englehart, Furst, Hill and Krathwohl, 1956) can be used to classify cognitive thought and associated behaviors into six hierarchical levels. A modification of Bloom's taxonomy was used in this study to determine at what levels of cognition test questions and out-of-class assignments occurred in college agricultural courses.

The levels identified in the taxonomy for classifying objectives and questions are based on the type of cognitive processes required to fulfill the objective or answer a particular question (Andre, 1979). The six levels defined in Bloom's taxonomy are: knowledge, comprehension, application, analysis, synthesis, and evaluation. The levels are presented in a hierarchical order, with knowledge being the simplest process and evaluation the most complex. Each level is intended to serve as a prerequisite skill for the next higher level (e.g., knowledge is required before comprehension can occur; application involves the use of both knowledge and comprehension, etc.).

Few college teachers have any training in general teaching skills, let alone skills in teaching at higher levels of cognition (Meyers, 1986). There is also a lack of effective training programs which focus on the utilization of higher-level questions on classroom tests. Hence, the authors felt it was important to determine how learning was distributed across the levels of cognition. Once this is known, professors can address the more important question of what ought to be. Furthermore, additional inquiry can be pursued to determine under what conditions higher order learning best occurs. Any efforts to help teachers grow and learn in this area should be sensitive to the expressed needs of the individuals involved as well as effective in counteracting deeply entrenched teaching practices taught for many generations (Wassermann, 1987).

PURPOSES AND OBJECTIVES

The purposes of this study were to determine the cognitive level of tests and student assignments currently being used in the College of Agriculture at The Ohio State University and to determine from faculty what steps should be taken toward improvement in teaching and testing at the higher levels of cognition.

This study sought to answer the following research questions:

1. How can the levels of cognitive behavior involved in student examinations and assignments be measured?

2. To what extent are current testing and assignment practices in the College of Agriculture at The Ohio State University requiring students to perform at each level of cognition?

3. What types of programs might be initiated to increase the amount of higher level cognitive activity in examinations and student assignments?

PROCEDURES

POPULATION AND SAMPLE

The population for the study consisted of all faculty members holding a teaching appointment in the College of Agriculture (N=188). A purposeful sample was drawn, with representation from each department within the College (n=22). These were faculty who were known to be dedicated teachers and who were known to be interested in the improvement of instruction. They would be considered to be among the most effective classroom teachers in the College. Sixteen participants completed the requirements of the study.

DESIGN OF THE STUDY

This was a descriptive study.

INSTRUMENTATION

Based on the review of literature in the field and consultation with David L. Krathwohl, one of the authors of the taxonomy, a model for assessing the cognitive levels of questions used in examinations and assignments was developed. The model consisted of four rather than six levels of learning and were:

1. Remembering - involves no more than a recall of information presented to the student;

2. Processing - requires an understanding of the information and its use in a procedural manner;

3. Creating - requires the combination of information in a form that is new to the student;

4. Evaluating - requires the student to use the information in making an independent judgment or evaluation.

Furst (1981) argues that it is necessary to know how the material was originally presented to the student to accurately classify a question in terms of its level of cognition. It was therefore decided that professors teaching courses being classified would assist the project staff in the classification process. Participants studied this system of classification under the direction of the project staff. They were also trained in classifying types of questions used in examinations and assignments into the specific levels of cognition.

Courses being taught in the College of Agriculture by the participant were selected for assessment. Both lower division (freshman/sophomore) and upper division (junior/senior) undergraduate courses were selected.

In calculating percentage distributions of student learning across the levels of cognition, it was decided to use weighted percentages. Weighted percentages were calculated by multiplying raw percentages derived from the joint classification (for each type of activity classified, e.g., tests, homework, etc.) times the weight used in calculating a student's final grade for the course for that activity. Percentages for each level of cognition were calculated by summing the weighted percentage for each activity classified.

DATA COLLECTION AND ANALYSIS

Data were collected through a three-stage process. Upon receiving instruction in the classification method to be used, participants and project staff independently classified questions used in tests and quizzes, homework, laboratories, and term project assignments for each of the courses studied. Each professor then met with a member of the project staff to jointly assess the items for that professor's course(s) and arrive at a consensus regarding any disputed classifications.

Data were then analyzed to determine the percentage of activity occurring at each cognitive level in the tests and assignments assessed. This analysis was presented to the participants and follow-up interviews were conducted. Information obtained from these interviews included participants' reactions to the assessment results and their suggestions for further study/work in this area.

Data were analyzed using measures to central tendency that provided a description of the distribution of learning across the levels of cognition by level of course.

RESULTS

DESCRIPTION OF THE SAMPLE

The average age of the participants in the study was 44 years. Sixty-two percent were full professors, while nineteen percent held the rank of associate professor and nineteen percent were assistant professors. The average length of service in the teaching profession was 13 years.

Twenty-five courses were selected for use in the study. Each course studied had been taught an average of 11 times by the participants.

DISTRIBUTION OF LEARNING ACROSS THE LEVELS OF COGNITION

Thirty-seven percent of the learning was at the remembering level. Forty-four percent of the learning was at the processing level, 6% at the creating level, and 13% at the evaluating level.

DISTRIBUTION OF LEVELS OF COGNITION BY LEVEL OF COURSE

Fifty-four percent of the learning in lower division (freshman/sophomore) courses was at the remembering level while 29% of the learning occurred at the remembering level in the upper division (junior/senior) courses. Thirty-nine percent of the learning was at the processing level in the lower division courses as contrasted with 51% in the upper division courses. A small proportion of learning occurred at the creating and evaluating levels in both divisions, with 2% creating and 5% evaluating in the lower division courses and 10% creating, 10% evaluating in the upper division courses.

DISTRIBUTION OF LEVELS OF COGNITION ACROSS INDIVIDUAL COURSES

When examining the distribution of learning across the levels of cognition for the individual courses, substantial differences were observed.

In the lower division courss, the median percentage of learning occurring at the remembering level was 54%, with a range of 12-97%. Across the higher levels of cognition, the median for processing was 36%, with a range of 3-81%, while the creating level had a median of 0% with a range of 0-12%, and evaluating had a median of 2.5% and a 0-17% range.

In upper division courses the median frequency for the remembering level was 27%, with individual courses ranging from 0-51%. Percentages at the processing level ranged from 24-92% with a median of 51%. The median frequency of learning at both the creating and evaluating levels was 8%, with ranges of 0-40% and 0-33% respectively.

DISTRIBUTION OF LEVELS OF COGNITION
BY TYPE OF COURSE ACTIVITY ASSESSED

A variety of student activities were included in determining the final grade of a course. For this study, all graded activities in each of the courses were divided into two major groups: (1) tests and quizzes and (2) assigned out-of-class student activity (e.g., laboratories, homework, individual and group projects, term papers, etc.). Each group of activities was then examined in terms of the levels of cognition to see if any distribution differences existed (Table 1).

Test and quiz questions for lower division courses were distributed across the levels of cognition as follows: remembering level - 61%; processing level - 35%; creating level - 1%; evaluating level - 4%. In terms of other assigned student activity, no activities were classified at the remembering level, 73% were at the processing level, 9% at the creating level, and 18% at the evaluating level.

In the upper division courses, one-third (33%) of test and quiz questions were classified as remembering, 51% processing, 6% creating, and 10% evaluating. Other assigned student activity had a greater percentage of higher level cognitive behavior in that 10% occurred at the remembering level, 55% were at the processing level, 17% were creating, and 18% were at the evaluating level.

INFLUENCE OF OUT-OF-CLASS ACTIVITIES ON DISTRIBUTION OF LEARNING ACROSS THE COGNITIVE LEVELS

The courses were divided into two groups and the distribution across the levels of cognition were examined. The two groups were: (1) those courses using only tests and quizzes to calculate the final grade; and (2) courses which also included out-of-class activities and student assignments in final grade determination.

For lower division courses that used only test and quiz grades to determine the final grade, 74% of the questions were at the remembering level; 23% required processing; 1% required creating; and 2% were at the evaluating level (Table 2). Those lower division courses which also included out-of-class activities in the grade determination had 41% of the total class activities occurring at the remembering level, 50% involved processing, 2% were at the creating level, and 7% were classified as evaluating.

Upper division courses showed the following distribution. Those courses calculating final grades based on test and quiz scores had 44% at the remembering level, 47% at the processing level, 5% at the creating level, and 4% at the evaluating level. Upper division courses that also included out-of-class activity in determining grades had 24% of the learning occurring at the remembering level, 52% at the processing level, 12% at both the creating and evaluating levels.

PARTICIPANT REACTION TO THE RESULTS OF THE STUDY

Participants were asked in a follow-up interview to express their reactions to the study. A short questionnaire was developed for recording faculty comments. Of the 15 participants interviewed, all felt the results of the study were similar to their initial assumptions about the cognitive level used in their tests and assignments.

Although all felt the results were similar to their expectations, 38% of those interviewed expressed some dissatisfaction with the distribution of their course ratings. Those dissatisfied felt there was too much lower level learning and expressed a desire to increase the extent of learning at the creating and evaluating levels.

Faculty were asked if the results of the survey accurately described the desired student accomplishments for each course. Eighty percent of those interviewed felt the results were on target in describing desired accomplishments, while the remaining twenty percent wanted their courses to force students to work more at the higher levels of cognition.

When asked if they would like to see changes made in their tests and assignments as a result of this study, 86% indicated a desire to make such changes. Respondents were then further questioned as to how they planned to bring about such changes. The following ideas were provided by the respondents:

1. Rewrite questions on tests to test for higher cognitive level abilities.

2. Modify homework assignments and projects to involve more higher level activity.

3. Revise methods of teaching to move students toward higher levels of cognitive thought.

4. Place more emphasis on writing skills in tests and assignments.

PARTICIPANT SUGGESTIONS FOR FURTHER STUDY

At the conclusion of the follow-up interview, participants were asked to indicate any further assistance they would like to receive in the area of levels of cognition. The following suggestions were given:

1. Provide a similar experience at a later time to measure any change that might have occurred in the distribution.

2. Offer in-service sessions on the following topics:

   a. how to teach and test at higher levels of cognition;
   b. how to write objective (multiple choice) items that test higher level ability;
   c. how to make the exam experience more positive and growth-oriented rather than focusing on student error rate;
   d. innovative approaches to instruction and testing that have been tried and found successful by college faculty.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

1. There were wide fluctuations in distribution of learning across the levels of cognition among individual faculty members.

2. There was more learning at the remembering level in lower division courses and more learning at the processing level in the upper division courses. There was limited learning taking place at the creating and evaluating levels for all courses.

3. In both lower division and upper division courses, the proportion of learning assessed at the higher levels of cognition was greater when instructors included laboratories, homework, individual and group projects, and term papers in addition to tests and quizzes.

4. Faculty felt the assessment accurately described the distribution of learning across the levels of cognition.

5. Faculty were interested in learning how to teach so as to produce more higher level learning and how to measure such learning.

RECOMMENDATIONS

1. Faculty should be made aware of the findings of this study and encouraged to determine the extent to which learning in their own course is distributed across the levels of cognition.

2. Sessions on ways to increase course activity at the higher levels of cognition should be offered.

3. Follow-up studies should be completed on participants of this study to see if changes have occurred in the levels of cognition.

4. Faculty need to be involved in discussions relative to what ought to be the distribution of learning in various types of courses.

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TABLE 1

DISTRIBUTION OF LEVELS OF COGNITION BY TYPE OF COURSE ACTIVITY ASSESSED

	Level of Cognition (in %)				
	R	P	C	E	Total
Lower Division Courses					
Tests and quizzes	61	35	1	4	100
Out-of-class activity	0	73	9	18	100
Overall	54	39	2	5	100
Upper Division Courses					
Tests and quizzes	33	51	6	10	100
Out-of-class activity	10	55	17	18	100
Overall	29	51	10	10	100
All Courses					
Tests and quizzes	44	44	4	8	100
Out-of-class activity	7	61	14	18	100
Overall	39	46	7	8	100

Note: R=Remembering; P=Processing; C=Creating; E=Evaluating

TABLE 2

DISTRIBUTION OF LEARNING ACROSS LEVELS OF COGNITION FOR COURSES WITH AND WITHOUT OUT-OF-CLASS ASSIGNMENTS

	Level of Cognition (in %)				
Courses	R	P	C	E	Total
Lower Division					
With out-of-class activity	41	50	2	7	100
Without out-of-class activity	74	23	1	2	100
Upper Division					
With out-of-class activity	24	52	12	12	100
Without out-of-class activity	44	47	5	4	100

Note: R=Remembering; P=Processing; C=Creating; E=Evaluating

LEVELS OF COGNITION OF TESTS AND ASSIGNMENTS IN AGRICULTURAL COURSES AT THE OHIO STATE UNIVERSITY

A Critique

Stacy A. Gartin, West Virginia University — Discussant

The researchers are to be commended for selecting and investigating a topic which is so timely. Levels of cognition of tests and assignments in our colleges certainly has implications for improving teaching and learning.

Strengths

I compliment the authors for preparing a report that was well written. Other strengths of the study are:

1. The introduction was thorough and built a need for the study.
2. The purposes and research questions have been clearly stated.
3. Sound data collection procedures were used.
4. Measures of central tendency were appropriately used to describe the data collected.
5. The results were reported clearly and concisely and were supplemented with appropriate tables.
6. The conclusions and recommendations are consistent with the findings.

Weaknesses

Because this is a quality piece of research, few weaknesses were found. A couple questions that I would raise are:

1. Why did you think it was important to select ... "dedicated teachers who were known to be interested in the improvement of instruction," and ... "among the most effective classroom teachers in the College?"
2. Six of your participants did not complete the requirements of the study. Should this be of concern to others who attempt to replicate your study?
3. Was the reliability of the follow-up questionnaire examined?

In conclusion, I think the researchers have conducted an interesting study. However, one might ask the question, "Whose responsibility is it to see that your recomendations are carried out?"

MATHEMATICAL PROBLEM-SOLVING SKILLS IN AGRICULTURAL MECHANICS OF UNDERGRADUATE STUDENTS IN AGRICULTURE

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INTRODUCTION

Most colleges and universities endorse the idea of developing students' cognitive processes beyond the mere acquisition of facts. Indeed, knowing when to use and apply the knowledge gained should be a primary aim of institutions of higher learning.

The College of Agriculture at The Ohio State University states the following objective in its Bulletin[1] as part of the College mission for undergraduate instruction:

> "To develop the student's ability to identify and define problems, formulate and test potential solutions and evaluate the results in a broad range of situations beyond the student's agricultural technical specialty."

Most faculty, if not all, endorse the idea of teaching students to become proficient in problem-solving and decision-making in today's highly complex and changing agricultural environment. The question remains, "Are we meeting this objective, and if so, how well?"

Gliem and Warmbrod[2] in their research on Mathematical Problem-Solving Skills in Agricultural Mechanics of Undergraduate Students in Agricultural Education state:

> "Undergraduate students (primarily juniors and seniors) preparing to be teachers of vocational agriculture demonstrated only a moderate level of competence in solving word problems in agricultural mechanics. Their level of achievement is lower than what is expected or desired of persons who will be teaching high school vocational agriculture students how to solve mathematical problems in agricultural mechanics."

Fischer and Grant[3] express the following:

> "Instructors in classrooms from elementary school to graduate school should provide opportunities for students to use all six cognitive levels. Factual information, considered essential in most subjects, is only the first level in the process of thinking. It is necessary, but not sufficient, for higher order cognition."

The cognitive processes referred to are Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation. Although many faculty contend that they teach and require students to use all levels of the cognitive processes, researchers seriously question the validity of these contentions.

McKeachie[4], in his research on teaching at the college and university level, says:

> "Even at the college level, research indicates that many faculty members

> have falsely assumed that the most complex thinking skills are a natural by-product of memorizing facts about a subject, and that students learn to use these higher order skills spontaneously in learning the subject itself."

Taylor[5] indicated that problem-solving is one of the overriding goals for today's instruction. The exact problems students will face in the future are not known, but it is certain that they will be living in a world of change. Therefore, the educational program must prepare students with problem-solving skills.

Fischer and Grant[3] also conducted a study of cognitive processes in forty randomly selected classes at two public and two private undergraduate institutions involving both large and small classes. They stated,

> "Most discourse was conducted on the lowest cognitive level, Knowledge, or the transmission of facts. A more disturbing issue, however, is raised by the limited opportunity students have to use a range of cognitive skills in college classrooms. We know from research at the elementary and secondary levels that students learn what they spend time learning. This...suggests that students are receiving little classroom practice in applying higher-order thinking processes to subject matter....It is clear from this study that complex thinking processes are not practiced in the principle intellectual meeting place on campus, the classroom."

This brief literature review suggests that undergraduates, including agricultural education majors, possess only moderate competence in mathematical problem-solving in agricultural mechanics and that faculty may not teach at the higher levels of the cognitive processes. The literature also suggests that research of this type is relatively sparse at the college level and basically non-existent for colleges of agriculture. Although faculty profess to the need, the importance of, and the desire for students to demonstrate competence in problem-solving and decision-making ability, there is not empirical evidence to even suggest that faculty are coming close to developing these desired student skills nor that students are achieving at the desired level of competence.

PURPOSE AND OBJECTIVES

The purposes of this study were to investigate the mathematical problem-solving skills in agricultural mechanics of undergraduates enrolled in a beginning level applied mechanics course (Agricultural Mechanization and Systems 110) which has as one of its objectives to increase students' problem-solving skills. The study also investigated the relationship between students' problem-solving skills and other perceived important variables. The following research questions were investigated:

1. What level of competence in mathematical problem-solving ability do undergraduate students enrolled in Agricultural Mechanization and Systems 110 have (a) when they enter the course; (b) when they complete the course; and (c) one and two quarters after completing the course.
2. What are the relationships between students' mathematical problem-solving ability and their (a) grade level; (b) major; (c) level and number of college math courses completed; (d) number of college physics courses completed; (e) number of college chemistry courses completed; (f) years of high school math, physics, and chemistry completed; (g) grade point average; (h) ACT test scores; and (i) whether they had vocational agriculture in high school.

PROCEDURES

This study utilized a pretest, multiple post-test design. Undergraduate students enrolled in Agricultural Mechanization and Systems 110, an applied beginning level mechanics course which has problem-solving as one of its major objectives, were tested. The course is comprised of undergraduate students from all agricultural disciplines and, occasionally, students from other colleges.

All students enrolled in the course Autumn Quarter, 1985, were required to take a 12-item problem-solving test during the first week of the quarter, and the same 12 questions were incorporated into a final exam which was taken at the end of the quarter. Students also completed a questionnaire during the first week to obtain information needed for the study. Students completing the course Autumn Quarter, 1985, were asked to return and retake the same 12-item problem-solving test and complete a questionnaire at the end of Winter Quarter, 1986, (approximately 12 weeks after Autumn Quarter) and again at the end of Spring Quarter, 1986, (approximately 23 weeks after Autumn Quarter). Two letters were sent and an honorarium was given each quarter to encourage students to return and participate. Table 1 shows the study's history and the number of students participating in each test.

Table 1
Study History and Student Participation

Month	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April	May	June
Test Administration	1			2			3			4
No. of Students Participating	20			20			15			10

Test 1 - Pretest given the first week of class during Autumn Quarter.
Test 2 - Final test given at the end of the quarter (10 weeks after Test 1).
Test 3 - Post-test 1 given one quarter after the Final test (12 weeks after Test 2).
Test 4 - Post-test 2 given two quarters after the Final test (23 weeks after Test 2).

Table 2 shows the 12-item problem-solving test that was used. The test was composed of multi-step problems involving whole numbers or a combination of whole numbers and decimals or fractions. The test was developed by selecting test questions from a previous problem-solving test that had been developed by a panel of experts in agricultural mechanics instruction for use by high school vocational agriculture students. The internal consistency of the 12-item test was assessed using Cronbach's alpha = 0.69. Twelve items were selected in an attempt to yield a valid and reliable test that could be completed by students in the time allowed. Students were given a sheet of useful conversion factors to use when solving the problems on the test.

Table 2
Mathematical Problem-Solving Test

1. A farmer has 72 acres of land in corn which is 45% of the entire farm. How many acres are in the entire farm?
2. A cylindrical silo is 30 feet in diameter and 70 feet high. How many cubic feet of silage will it hold?
3. A tractor pulls a 9-foot mower at a speed of 6 miles per hour. It is estimated that 20% of the total time is lost in turning at ends, making adjustments, etc. What is the number of hours required to cut a 20-acre field of hay?
4. How many pounds of wettable powder would you put into a 200 gallon spray tank if 12 gallons of water and 2.3 pounds of wettable powder are to be applied per acre?
5. A fertilizer distributor is driven by a 30 inch diameter wheel. The distributor contains 40 outlets which are spaced 4 inches apart. If 27 pounds of fertilizer are collected from all outlets when the drive wheel is turned 50 revolutions, how many pounds per acre will the machine apply?
6. Assuming 100 percent plant germination and survival, determine the theoretical plant population per acre when the distance between rows is 30 inches and the distance between seeds in the row is 8 inches.
7. An 8 row planter is used to plant corn in 30 inch rows. If the 16 cell planter plate turns 8 revolutions while the 28 inch planter drive wheel turns 10 revolutions what is the theoretical space (seed spacing) between seeds in the row?
8. A tractor is priced at $30,000. The dealer will allow a 12.5% discount to promote a quick sale. What is the sale price of the tractor?
9. How many acres are there in an area with a width of 200 feet and a length of 240 feet?
10. If a farmer is spraying an 80 acre field, what percent of the work is completed after 35 acres have been sprayed?
11. If the percentage of an active ingredient in herbicide granules is 15 percent and 1/2 pound of active ingredient is required per acre, how many pounds of granules should be applied per acre?
12. A 40-acre field of soybeans is to be planted with a 12-row planter traveling at 5 miles per hour. The row spacing is 15 inches. How many hours are required to plant the field if there is no time loss?

ANALYSIS OF DATA

The SPSSPC microcomputer statistical package was used to calculate measures of central tendency, correlation, analysis of variance, and other inferential statistics.

RESULTS

PROBLEM-SOLVING ACHIEVEMENT OF UNDERGRADUATES

Undergraduate students had an average score of 6.05 (50.4 percent of the items correct) on the 12-item problem-solving test upon entering Agricultural Mechanization and Systems 110 (Table 3). The distribution of scores ranged from 2 to 9 with a median score of 6.00.

Fifty-five percent of the undergraduates correctly solved 6 or less of the 12 problems on the test. Forty-five percent of the undergraduates correctly solved 7 or more of the 12 problems. The top score of 9 correctly solved problems represented 75 percent of the items.

Table 3
Frequency and Percentage Distribution of Student's Scores on the Mathematical Problem-Solving Pretest

Score	Frequency	Percent	Cumulative Percent
0	0	0	0
1	0	0	0
2	2	10	10
3	1	5	15
4	2	10	25
5	2	10	35
6	4	20	55
7	4	20	75
8	1	5	80
9	4	20	100
10	0	0	100
11	0	0	100
12	0	0	100
Total	20	100	100

Mean = 6.05 S.D = 2.24 Mode = 6.00 Median = 6.00

Undergraduate students exhibited a significantly greater competence in mathematical problem-solving after completing the course requirements for Agricultural Mechanization and Systems 110 (Table 4). On the same 12-item problem-solving test, students had an average score of 9.05 (75.4 percent of the items correct). This represented an average 50 percent gain in students' test scores after enrollment in the course. The distribution of scores ranged from 5 to 12 with a median score of 10.

Ten percent of the undergraduates correctly solved 6 or less of the 12 problems on the test. Ninety percent of the undergraduates correctly solved 7 or more of the 12 problems. The top score of 12 correctly solved problems represented 100 percent of the items.

Table 4
Frequency and Percentage Distribution of Student's Scores on the Mathematical Problem-Solving Final Test

Score	Frequency	Percent	Cumulative Percent
0	0	0	0
1	0	0	0
2	0	0	0
3	0	0	0
4	0	0	0
5	1	5	5
6	1	5	10
7	5	25	35
8	0	0	35
9	2	10	45
10	5	25	70
11	5	25	95
12	1	5	100
Total	20	100	100

Mean = 9.05 S.D. = 2.04 Mode = 7.00 Median = 10.00

Undergraduate students retained their increased mathematical problem-solving ability in agricultural mechanics for one quarter (12 weeks) and two quarters (23 weeks) after completion of the course. Students had an average score of 9.27 (77.3 percent of the items correct) on the 12-item problem-solving test with a standard deviation of 2.09 one quarter later (12 weeks). The distribution of scores ranged from 4 to 12 with a median score of 10.00. Seven percent of the students correctly solved 6 or less of the 12 problems on the test. Ninety-three percent correctly solved 7 or more of the 12 problems. The top score was 12 which was 100 percent of the items correctly solved.

Students had an average score of 9.00 (75 percent of the items correct) on the 12-item problem-solving test with a standard deviation of 2.06 two quarters (23 weeks) after completion of the course. The distribution of scores ranged from 5 to 11 with a median score of 10.00. Twenty percent of the students correctly solved 6 or less of the 12 problems on the test. Eighty percent correctly solved 7 or more of the 12 problems. The top score was 11 which was 91.7 percent of the items correctly solved.

RELATIONSHIP BETWEEN STUDENTS' SCORES AND SELECTED VARIABLES

Multiple regression analysis showed no significant relationships between the selected variables and the pretest, and final test scores. It did show a significant positive relationship between a student's ACT math score and their post-test 1 score (taken 12 weeks after completion of the course). A significant negative relationship existed between the number of calculus and remedial mathematics courses completed by the student and their post-test 2 score (taken 23 weeks after completion of the course). See Tables 5 and 6.

Table 5
Summary Data for Regression of Post-test 1 and Post-test 2
Score on Mathematical Problem-Solving Test on Selected Variables

Post-test 1
n=15

Variable	Intercorrelations		Mean	S.D.
	X_1	Y		
ACT Math Score (X_1)	1.00	.63	18.8	5.89
Test Score (Y)		1.00	9.27	2.09

Post-test 2
n=10

Variable	Intercorrelations			Mean	S.D.
	X_1	X_2	Y		
Remedial Courses(X_1)	1.00	.19	-.76	.50	.85
Calculus Courses(X_2)		1.00	-.61	.70	1.06
Test Score (Y)			1.00	9.0	2.06

Table 6

Regression of Score on Mathematical Problem-Solving Post-test 1 and Post-test 2 on Selected Variables

Post-test 1 n=15				Post-test 2 n=10			
Variable	Partial Regression Coefficient	t	p	Variable	Partial Regression Coefficient	t	p
ACT Math Score	.22	2.94	.05	Remedial Courses	-1.63	-4.05	.05
(Constant)	5.06			Calculus Courses	- .95	-2.93	.05
				(Constant)	10.48		

R^2=.40; $p<.01$; Standard error=1.68 R^2=.81; $p<.05$; Standard error=1.01

Forty percent of the variance in scores on post-test 1 can be explained by the ACT math score of the student. Eighty-one percent of the variance in post-test 2 scores can be explained by the linear combination of two variables - - number of calculus and remedial mathematics courses completed by the student. The regression analysis indicates that each variable contributes significantly to the equation when the other variable in the equation is held constant (Table 6). An examination of residuals indicated that the assumptions basic to regression analysis were not violated.

Students who had a higher ACT math score scored significantly better on post-test 1 which was given one quarter (12 weeks) after completion of the course. Undergraduate students who had completed more remedial mathematics courses scored significantly lower on post-test 2 which was given 2 quarters (23 weeks) after completion of the course. Students also scored significantly lower on post-test 2 with each additional calculus course completed.

CONCLUSIONS AND RECOMMENDATIONS

From the results of this study, the following conclusions and recommendations are given:

1. Undergraduate students comprised of majors from several departments in the college of agriculture are not competent in mathematical problem-solving in agricultural mechanics. Their level of competence is extremely poor and much below the level expected or desired for college students.
2. Undergraduate students need to be taught mathematical problem-solving in agricultural mechanics. The application of the principles of physical science to career-demands, makes it imperative that college of agriculture graduates have a basic, fundamental knowledge of mathematical problem-solving involving the physical sciences.
3. Undergraduate students can learn to be better mathematical problem-solvers in agricultural mechanics. Through the teaching of a method(s) for systematically solving problems and through practice, one can significantly improve upon poor performance as a problem-solver.
4. Undergraduate students retain increased mathematical problem-solving ability in agricultural mechanics for at least 23 weeks (approximately 6 months) after completion of Agricultural Mechanization and Systems

110 which has as one of its objectives to increase student mathematical problem-solving abilities.

5. ACT math score and the number of calculus and remedial mathematics courses completed by the student had a significant relationship over time to their performance on a mathematical problem-solving test. The higher the student's ACT math score the higher they scored over time on a mathematical problem-solving test. However, the greater the number of calculus and remedial mathematics courses completed by the student the lower they scored over time on a mathematical problem-solving test. This may indicate that one only needs a basic, fundamental knowledge of how and when to use the mathematical operations of addition, subtraction, multiplication and division, and to understand the basic physical relationship/concept to be successful as a problem-solver. It may also suggest that the approach taken to problem-solving may be more important than having additional course work in mathematics. One could also hypothesize that those who have completed advanced mathematics courses do not work as hard during the course; consequently, they do not retain the knowledge and skill for as long as those students who worked harder.
6. Additional research needs to be completed to answer the following questions:
    a. Do these results exist with other groups of students and in other disciplines?
    b. What teaching-learning behaviors have the greatest impact on student growth in problem-solving competence?
    c. Should and can all college courses be taught with a problem-solving approach?
    d. Is student competence in problem-solving a function of how they have been taught?
    e. What restraints affect our ability to effectively teach problem-solving?

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MATHEMATICAL PROBLEM-SOLVING SKILLS IN AGRICULTURAL MECHANICS OF UNDERGRADUATE STUDENTS IN AGRICULTURE

A Critique

Martin B. McMillion, Virginia Tech -- Discussant

The authors are to be commended for conducting a rather well-controlled study that had a longitudinal aspect. The nature of the problem and need for the study had good documentation. The pre-test, post-test gave the impression that an experimental study was being conducted, but no description of a treatment was given. Conclusion #3 even had reference to "teaching of a method for systematically solving problems." The authors recommended a teaching procedure that they may or may not have used. Regardless, there was no comparison with other ways of teaching how to work the math problems.

Inclusion in the paper of the math problems used in the study, helped the reader to understand the level of math ability of the students. It would be expected that there would be other forms of the test for some of the subsequent examinations. It was stated that the same questions were used each time. Since the students were working the same 12 problems four times in less than a year, just recall might be operating instead of problem solving ability being increased.

The authors worded the recommendations in such a way that they did not generalize the recommendations in any flagrant way beyond the students who enrolled in a particular course in one term in one university. For that they are complimented.

Mention was made in the paper of statistical procedures that were not used. Perhaps part of the study was not reported and the extra statistical procedures were not removed. "Inferential statistics" was one of the extra terms. In addition to being superfluous, it would also be inappropriate because the sample was the population.

MATHEMATICAL PROBLEM-SOLVING SKILLS OF HIGH SCHOOL VOCATIONAL AGRICULTURE TEACHERS AND STUDENTS

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INTRODUCTION

The ability to solve mathematical problems is considered important now and for a student's future needs. Education in mathematics was supported by Mayer (1982) when he stated:

> "Mathematics is the foundation for many fields including science, engineering, business, and economics, and is vital to individuals' everyday survival as consumers."

Corman (1980) also supported this when she wrote:

> ". . . ability to read with understanding, write, and compute are generally regarded as critical to subsequent learning and employability of a student entering the labor market, upgrading present skills, or being retrained."

The literature supports the concept that the ability to use mathematics is important for a student's learning, living, working, and survival.

The subject of mathematics includes an area referred to as mathematical problem-solving. Education experts agree that mathematical problem-solving is important. Taylor (1977) stated:

> "The one overriding goal for mathematics instruction today is problem-solving. We don't know exactly what problems students will face in the future, but we do know that they will be living in a world of change. Therefore, we must prepare them to deal with the wide range of problems that they will face in a variety of situations."

It is written in The Agenda for Action (1980) that:

> "Problem-solving involves applying mathematics to the real world serving the theory and practice of current and emerging sciences, and resolving issues that extend the frontiers of mathematical sciences themselves."

The Agenda for Action Document (1980) also stresses that, "problem-solving must be the focus of school mathematics in the 1980's."

Even though experts agree that mathematical problem-solving and mathematics are important, studies have shown that secondary students are poor to moderate in both mathematical problem-solving and mathematical skills. The California Assessment Program (1979) found that over one-half of the twelfth graders in California public schools were unable to solve simply story problems. Falakdine (1984) found that junior and senior vocational agriculture students studying production agriculture were at best only moderate mathematical problem-solvers based upon a mathematical problem-solving test. Bourque (1976) reported that students earned average scores on mathematical tests involving addition, subtraction, multiplication, and division, but earned low scores on tests involving algebra, mathematical and multi-step word-problems. Gliem and Warmbrod (1985) reported vocational agriculture students achieved at a relatively low level of competence on a test which measured their skill in performing the mathematical operations of addition, subtraction, multiplication, and division.

This brief review of literature supports the need for mathematical problem-solving and also documents the poor competence of students in mathematical problem-solving. The literature was lacking in regard to research related to teacher competence in problem-solving and the relationship between teacher competence and its effect on student competence in mathematical problem-solving.

PURPOSE AND OBJECTIVES

This study investigated problem-solving skills in agricultural mechanics of high school vocational agriculture teachers and students. The following research questions were investigated:

1. What level of competence in solving mathematical problems do vocational agriculture teachers acquire?
2. What level of competence in solving mathematical problems do high school vocational agriculture students acquire?
3. What are the relationships between high school students' level of competence in solving mathematical problems and the following variables: (a) teacher competence in solving mathematical problems; (b) type of high school mathematics courses completed by students; (c) sex of the students; (d) class rank of the students; (e) grade level of the students; (f) whether a calculator was used in solving the problems; (g) whether students liked mathematical word problems; and (h) how students rated themselves as mathematical problem-solvers.

PROCEDURE

Three instruments, a Teacher Questionnaire, a Student Questionnaire, and a Mathematical Problem-Solving Test were used to collect data. The 20-item test included one-step and multiple-step problems involving whole numbers, decimals or fractions, and a combination of whole numbers and decimals or fractions. The same Mathematical Problem-Solving Test was used with teachers and students. The test had been developed previously by a panel of experts in agricultural mechanics instruction for use by high school vocational agriculture students. This panel was composed of selected teachers of vocational agriculture and professors of agricultural mechanization. The test had been tested for content validity and reliability (Cronbach's alpha = 0.89). Twenty items were selected in an attempt to yield a valid and reliable test that could be completed by students during one class period.

A census of 71 vocational agriculture teachers who had started teaching in 1980 and were still teaching in 1986 were surveyed during the Spring of 1986. They were asked to complete the Teacher Questionnaire and to take the Mathematical Problem-Solving Test. They were also asked to have their most advanced class of vocational agriculture students complete the Student Questionnaire and Mathematical Problem-Solving Test. Data were available for 54 vocational agriculture teachers and 656 freshman, sophomore, junior, and senior vocational agriculture students.

Follow up mailings and telephone calls to nonrespondents were made to encourage completion and return of the instruments. An analysis of early and late respondents showed no differences between the groups.

ANALYSIS OF DATA

All data was coded and appropriate statistical procedures were used for measures of central tendency, correlation, analysis of variance, and other inferential statistics. The SPSSx statistical package was used for analysis at the University's Instruction and Research Computation Center.

RESULTS

TEACHERS LEVEL OF COMPETENCE IN SOLVING PROBLEMS

Teachers of vocational agriculture had an average score of 12.35 (61.8 percent of the items correct) on the 20-item Mathematical Problem-Solving Test (Table 1). The distribution of scores ranged from 1 to 20 with a median score of 13.

Approximately twenty-eight percent of the teachers correctly solved 50 percent or less of the problems. Seventy-two percent of the teachers correctly solved over 50 percent of the problems. Four percent of the teachers correctly solved all problems on the Mathematical Problem-Solving Test.

Table 1
Scores on Mathematical Problem-Solving Test by
Teachers of Vocational Agriculture

Score	Frequency	Percent	Cumulative Percent
0	0	0.0	0.0
1	1	1.9	1.9
2	0	0.0	1.9
3	1	1.9	3.7
4	1	1.9	5.6
5	1	1.9	7.4
6	1	1.9	9.3
7	1	1.9	11.1
8	5	9.3	20.4
9	3	5.6	25.9
10	1	1.9	27.8
11	7	13.0	40.7
12	4	7.4	48.1
13	6	11.1	59.3
14	5	9.3	68.5
15	5	9.3	77.8
16	1	1.9	79.6
17	3	5.6	85.2
18	5	9.3	94.4
19	1	1.9	96.3
20	2	3.7	100.0
Total	54	100.0	100.0

Mean = 12.35 S.D. = 4.36 Median = 13.00 Mode = 11.00

STUDENTS LEVEL OF COMPETENCE IN SOLVING PROBLEMS

Vocational agriculture students had an average score of 5.64 (28.2 percent of the items correct) on the 20-item Mathematical Problem-Solving Test (Table 2). The distribution of scores varied from 0 to 20. The positively skewed distribution of scores had a median of 5.00.

Eighty-two percent of the students correctly solved 50 percent or less of the problems with fifty-six percent of the students correctly solving only 25 percent or less of the problems on the test. Eighteen percent of the students correctly solved over 50 percent of the problems. Four students (0.7 percent) correctly solved 90 percent or more of the problems. One student (0.2 percent) correctly solved all problems on the Mathematical Problem-Solving Test.

Table 2
Scores on Mathematical Problem Solving Test By
Vocational Agriculture Students

Score	Frequency	Percent	Cumulative Percent
0	69	10.5	10.5
1	76	11.6	22.1
2	68	10.4	32.5
3	57	8.7	41.2
4	51	7.8	48.9
5	47	7.2	56.1
6	42	6.4	62.5
7	41	6.3	68.8
8	24	3.7	72.4
9	36	5.5	77.9
10	29	4.4	82.3
11	26	4.0	86.3
12	22	3.4	89.6
13	24	3.7	93.3
14	14	2.1	95.4
15	18	2.7	98.2
16	6	0.9	99.1
17	2	0.3	99.4
18	2	0.3	99.7
19	1	0.2	99.8
20	1	0.2	100.0
Total	656	100.0	100.0
Mean = 5.64	S.D. = 4.54	Median = 5.00	Mode = 1.00

RELATIONSHIP BETWEEN VOCATIONAL AGRICULTURE STUDENTS' SCORES AND SELECT VARIABLES

Data reported in Table 3, indicate that higher scores on the Mathematical Problem-Solving Test were achieved by vocational agriculture students who had completed more high school courses in mathematics (algebra, plane geometry, solid geometry, trigonometry, and calculus), used a calculator when completing the test and rated their ability as problem-solvers higher.

Table 3
Student Scores on Mathematical Problem-Solving Test
for Groups of Vocational Agriculture Students

Variable and Groups	n	$\overline{X}$	SD
Number of Advanced Math Courses			
0	211	3.04	2.93
1	139	4.41	3.85
2	128	6.53	4.33
3	100	8.25	4.59
4	50	9.52	3.96
5	25	11.00	4.44
Use of Calculator			
Yes	240	6.83	4.75
No	411	3.62	3.33
Problem Solving Ability			
Poor	55	2.89	3.32
Fair	259	4.58	4.03
Good	283	6.86	4.58
Excellent	43	8.16	5.29

The relationships between the aforementioned variables and student score on the Mathematical Problem-Solving Test were confirmed through regression analysis reported in Tables 4 and 5. Forty-one percent of the variance in student scores on the test is explained by the linear combination of four variables - - number of advanced mathematics courses completed, whether a calculator was used when taking the test, how students rated themselves as problem-solvers, and teacher score on the Mathematical Problem-Solving Test. The regression analysis indicates that each of these variables contributes significantly to the equation when the other variables in the equation are held constant (Table 5). An examination of the residuals indicated that the assumptions basic to regression analysis were not violated.

Table 4
Summary Data for Regression of Student Score on Mathematical Problem-Solving Test on Selected Variables
n = 579

Variable	Intercorrelations X_1	X_2	X_3	X_4	Y	Mean	SD
Number Advanced Math Courses (X_1)	1.00	.20	.35	.09	.57	1.29	1.40
Use of Calculator[a] (X_2)		1.00	.11	.04	.36	1.37	.48
Problem Solving Ability[b] (X_3)			1.00	.02	.34	2.48	.74
Teacher Test Score (X_4)				1.00	.14	12.29	4.28
Student Test Score (Y)					1.00	5.65	4.47

[a] 1 = Did not use calculator; 2 = Used calculator
[b] 1 = Poor; 2 = Fair; 3 = Good; 4 = Excellent

Table 5
Regression of Student Score on Mathematical Problem-Solving Test on Selected Variables
n = 579

Variable	Partial Regression Coefficient	t	p
Number Advanced Math Courses	1.49	13.37	.001
Use of Calculator	2.25	7.44	.001
Problem Solving Ability	.87	4.21	.001
Teacher Test Score	.08	2.49	.001
(Constant)	3.63	4.53	.01

$R^2 = .41$ $p<.001$ Standard error = 3.44

Students who had completed more high school courses in advanced mathematics (algebra and above) achieved higher scores on the test. Each additional mathematics course completed by students is associated with an increase of approximately 1.5 points on the 20-item test - - an increase of 7.5 percent.

Other studies (Gliem and Warmbrod, 1985, and Barrow, Mullis, and Phillis, 1982) have shown that students using calculators to solve mathematical problems score higher than students who do not use calculators. That finding was confirmed in the research reported in this paper in that students using calculators scored an average of 2.25 points higher (approximately an 11 percent increase) on the test than students who did not use calculators when completing the test.

Students ratings of themselves as mathematical problem-solvers, and teacher score on the Mathematical Problem-Solving Test were also significantly related to the scores students achieved on the test. When the other variables in the equation are held constant, one unit increase in each of these two variables accounted for approximately a 1 point (5 percent) increase in student score on the Mathematical Problem-Solving Test.

CONCLUSIONS AND RECOMMENDATIONS

From the results of this study, the following conclusions and recommendations are given:

1. Vocational agriculture teachers need to be taught mathematical problem-solving in agricultural mechanics. Their mean score of 12.4 or 62% on a twenty-item test of the type taken is below the level of competence that should be expected.
2. Students of vocational agriculture need to be taught mathematical problem-solving in agricultural mechanics. Their mean score of 5.6 or 28% on a twenty-item test of the type taken is below the level of competence needed for successful entry into today's work force.
3. Teacher educators and state supervisors need to jointly plan and provide inservice-education for vocational agriculture teachers in mathematical problem-solving.
4. Curriculum materials need to be developed which will help teachers of vocational agriculture to easily, effectively, and efficiently teach mathematical problem-solving to vocational agriculture students.
5. For students to obtain a higher level of competence in mathematical problem-solving, one would suggest that students enroll in algebra, geometry, and other advanced mathematics courses in addition to enrollment in vocational agriculture. General math does not appear to provide the background and skill needed for mathematical problem-solving.
6. Vocational agriculture students using a calculator were more proficient in performing mathematical operations than students not using a calculator. Therefore, teachers should encourage students to learn to use proficiently and accurately a calculator when solving mathematical problems.
7. Vocational agriculture students who rated themselves higher relative to their mathematical problem-solving ability scored higher on the problem-solving test. Therefore, greater student competence in mathematical problem-solving should increase one's perception of this ability.
8. Additional research needs to be completed to answer the following questions:
   a. Is the lack of mathematical problem-solving competence a regional and/or national problem?
   b. Are teachers of vocational agriculture teaching mathematical problem-solving to their students?
   c. What is the best method(s) to use in teaching vocational agriculture teachers and students mathematical problem-solving?

d. How can students' high school mathematics classes be best interfaced with vocational agriculture classes to make learning relevant, while at the same time increasing students' level of competence in mathematical problem-solving?

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MATHEMATICAL PROBLEM-SOLVING SKILLS OF HIGH SCHOOL VOCATIONAL AGRICULTURE TEACHERS AND STUDENTS

Martin B. McMillion, Virginia Tech - Discussant

The study was directed at an important aspect of subject matter that both teachers and students in vocational agriculture should know. Perhaps the most important finding was that the teachers were deficient in solving simple mathematical problems and that their degree of knowledge was one of four of the best predictors of how well students would do on the math test. A paired t-test would have been interesting to use.

There was no problem with validity and reliability in the study. Recent graduates and their students seemed to be an appropriate group to study. The total percent response was unclear. Apparently 76 percent of the teachers and schools cooperated in the study. There is some question whether or not the follow-up respondents were additional. Persons responding to follow-up mailings and telephone calls were labeled late respondents. An analysis of early and late respondents showed no differences, and apparently they were included. If the telephoned non-respondents were randomly chosen, they would make a legitimate non-respondent group for comparison. Mixing of those who responded to a follow-up mailing and those telephoned is questioned as a sound procedure.

Use of a calculator was one of the significant factors in the partial regression. The use of a calculator meant that the student was using it to take the test (dependent variable). Perhaps a better design would have been to ask if the respondents normally used a calculator, but proceed to give the test using small numbers that could have been easily worked by hand. Another question about the study is whether there was any time restriction in taking the test. Those doing the problems by hand would be at a disadvantage if time was limited. At least, assumptions or beliefs of the researchers about the place of calculators in education should have been provided in the paper.

A word of caution concerning generalization of the recommendations would have been in order. Only schools in which the teacher had been on the job between 1980 and 1986 were included in the study. Just maybe the teacher who had been out 20 years would not need as much in-service training on math problems. That question would have been one to list in suggestions for further study.

MICROCOMPUTERS AND INSTRUCTION: USING A DRILL AND PRACTICE APPROACH

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INTRODUCTION

Microcomputers have become available for use in schools during the last decade. Protheroe, Carroll, and Zoetis (1982) reported that 77.4 percent of the school districts responding to a nationwide survey were using computers for instructional purposes. With the number of microcomputers used in classrooms continuing to increase, educators have been gathering descriptive information about the types and the purposes for which they are being used. There is an expressed need, however, to investigate further. Three separate studies, related to the status of microcomputer use in vocational agriculture education in different states, targeted the use of the microcomputer as an instructional tool in their recommendations. Henderson (1985, p. 10) stated, "Research studies . . . should be conducted to determine the relationship between microcomputer use and educational outcomes. Little empirical evidence exists on the role and value of microcomputers in educational settings." Malpiedi, Papritan, and Lichtensteiger (1985, p. 9) said, "Further research in Ohio needs to focus on . . . the implementation and use of computers as well as the effectiveness of computer education." And Foster and Miller (1985, p. 10) stated, "Inservice offerings should address the comprehensive use of the microcomputer as an instructional tool . . ." The research conducted by Rohrbach (1983) addressed this vital area.

Many instructional approaches have been developed or adapted for use with microcomputers. However, little evidence is available for the educational planner to use in making a judgment in selecting the most appropriate approach for instruction. Therefore, the focus of this study was to examine a drill and practice approach in using the microcomputer as an instructional tool.

PURPOSE AND OBJECTIVES

The purpose of this study was to assess the effectiveness of teaching students in vocational agriculture programs using a lecture/discussion instructional method as compared to the lecture/discussion method with a microcomputer drill and practice component. The following student characteristics were used in the comparisons: grade point average, previous computer experience, farm experience, soil management experience, gender, attitude toward microcomputers, first lesson achievement score, attitude toward subject matter, and treatment grouping.

Specific research questions were:

1. Does the achievement of students differ when they are taught using a lecture/discussion teaching strategy with a microcomputer drill and practice component as compared to a lecture/discussion teaching strategy?

2. Does a single student characteristic or combination of student characteristics account for a significant portion of the variance associated with the student achievement score?

3. Do student attitudes toward subject matter differ when they are taught using a lecture/discussion teaching strategy with a microcomputer drill and practice component as compared to a lecture/discussion teaching strategy?

The following null hypotheses were tested at the .05 alpha level.

Ho_1: There is no significant difference between the group means of performance scores of students receiving the lecture/discussion teaching strategy and the microcomputer component teaching strategy.

Ho_2: There is no student characteristic or combination of student characteristics which can be used to explain a significant proportion of the variance associated with the posttest knowledge achievement scores.

Ho_3: There is no significant difference between the group means of student attitudes toward subject matter of students receiving the lecture/discussion teaching strategy and the microcomputer component teaching strategy.

PROCEDURES

This study involved vocational agriculture students who were randomly assigned to a comparison group and a treatment group. This study required selected vocational agriculture teachers to teach two lessons. The first lesson focused on the general topic of soil erosion to establish a subject matter base for participating students. The second lesson constituted the experimental treatment and focused on the use of the universal soil loss equation.

Lesson plans were prepared by a team of graduate students at the University of Missouri-Columbia. The two lesson plans, related tests, and the microcomputer program were reviewed by a panel of experts consisting of Agricultural Education, Agronomy, and Agricultural Engineering faculty members. This panel examined and approved the construct and content validity of the lesson plans and achievement test instruments. Software used in the microcomputer drill and practice component was created specifically for this study. The software program was evaluated for appropriate construction and suitability as a drill and practice exercise by two professors who teach programming courses. A pilot test was conducted prior to the experiment to assess the procedures planned for the study. Appropriate adjustments were made in the procedures, content, and construction of the instruments according to the recommendations of the reviewers and as a result of the pilot test.

The study required five consecutive class periods at each participating school. Students in both treatment groups were taught the lesson focusing on soil erosion by the local instructor with lesson plans provided by the investigator during the first two class periods. At the conclusion of the first lesson on soil erosion, students completed a pre-experiment achievement test.

The local instructor taught the second lesson which focused on the use of the universal soil loss equation to students in both treatment groups during the third and fourth class periods. Both treatment groups were taught together for the majority of the lesson. However, students selected for the microcomputer treatment group were removed from the classroom setting during the discussion portion of the lesson which involved the development of localized soil erosion problems. Students assigned to the microcomputer treatment group were allowed twenty minutes of instruction utilizing the microcomputer drill and practice program. The microcomputer program presented problems similar to those which were being developed by the local instructor with the comparison group in the classroom. At the completion of the twenty minute time period, students assigned to the microcomputer treatment group returned to the classroom for the summary and conclusion portion of the lesson. Both groups of students completed an achievement test over the second lesson and a student demographic information instrument during the fifth class period. Data reflecting individual student grades were obtained from the high school counselor in each respective school.

POPULATION

This report presents a portion of a larger study which was conducted by Agricultural Education faculty members at the University of Missouri-Columbia. The broader study examined four teaching strategies, a lecture/discussion (comparison group) with three teaching strategies utilizing different microcomputer-assisted instructional components. This report will be limited to an assessment of a teaching strategy which incorporated a microcomputer drill and practice component.

The broader study was the determining factor in calculating the sample size and the number of students involved in each group. The total population consisted of 5,784 junior and senior vocational agriculture students in Missouri (Heiman, 1986). A cluster sampling technique was used. Krejecie and Morgan (1970) provided an objective method for determining the appropriate sample size when the size of the population is known. From the Krejecie and Morgan table, it was determined that the sample size for the combined study should be 360 students. Therefore, usable data were collected from 31 schools randomly selected to participate in the study. Students in each program selected were randomly assigned to the four treatment groups in approximately equal numbers to control for anticipated differences in the effectiveness of individual teacher participants.

INSTRUMENTATION

Two evaluation instruments, the knowledge achievement tests for the first and second lessons, were developed for this study. These instruments were reviewed by Agronomy faculty members for content validity and adjusted as per their recommendations. Cronbach's alpha for the first knowledge achievement test was calculated to be .73. The reliability coefficient for the second lesson knowledge achievement test was calculated to be .76.

The attitude toward subject matter assessment instrument was adapted from the "Attitude Toward Any School Subject" by Remmers (1986), Purdue Research Foundation. This instrument was modified to include the use of a seven-point Likert-type scale. Twenty questions from the original instrument were selected and the words "subject matter" were replaced with the words "soil management." The Cronbach's alpha reliability coefficient calculated for this instrument was found to be .96.

ANALYSIS OF DATA

This study utilized a two group, posttest only experimental design. A _t_ test was used to test the first and third hypotheses in this study. A stepwise, multiple regression procedure was used to test hypothesis two.

RESULTS

A total of 144 secondary students from 31 randomly selected Missouri vocational agriculture programs provided usable data for analysis. The major factor contributing to non-participation by students from the original sample was due to student absences. Plans to follow-up non-participants were rejected as it was not feasible to repeat the experiment in the selected schools. The student achievement and attitude scores are presented for each group in Table 1.

Table 1

Student Attitude and Achievement Scores

	_N_	Mean	Standard deviation	Low value	High value
Grade point average					
Comparison group	68	2.34	0.67	1.15	3.95
Treatment group	68	2.51	0.70	1.15	3.91
Total	136				
Attitude toward microcomputers					
Comparison group	61	96.07	18.31	59	140
Treatment group	59	96.10	22.76	35	140
Total	120				
First knowledge achievement test score					
Comparison group	68	13.47	3.67	5	20
Treatment group	68	14.34	3.33	6	20
Total	136				

Table 1 (continued)

	N	Mean	Standard deviation	Low value	High value
Initial attitude toward subject matter					
Comparison group	65	92.28	19.63	41	130
Treatment group	66	96.56	17.75	43	131
Total	131				
Second knowledge achievement test score					
Comparison group	68	12.18	3.57	2	17
Treatment group	68	12.34	3.20	4	17
Total	136				
Final attitude toward subject matter					
Comparison group	61	86.84	22.50	20	138
Treatment group	62	92.27	16.51	44	133
Total	123				

The first null hypothesis, developed to ascertain if there was a difference in the posttest knowledge achievement scores of the two treatment groups, was not rejected.

The results of the *t* test are reported in Table 2.

Table 2

T-test for Difference Between Comparison and Treatment Group Scores for Achievement and for Attitude

	n	$\bar{X}$	*t*
Achievement			
Comparison group	68	12.1765	1.151
Treatment group	68	12.3382	
Attitude			
Comparison group	61	86.836	7.035
Treatment group	62	92.266	

The t value of 1.151 was less than the critical value of 1.978 at the .05 level of significance. There was no significant difference in the mean scores of the groups.

The second null hypothesis, developed to ascertain if a significant proportion of the variance associated with the students' achievement scores could be predicted by a combination of variables, was rejected.

The results of the stepwise regression analysis are presented in Table 3. Three variables, first test knowledge score, grade point average, and soil management experience entered the regression equation as significant predictors. These variables accounted for 46% of the variance.

Table 3

Stepwise Regression of Posttest Knowledge Achievement Scores and Selected Variables

Variable	Entered	Partial R^2	F	p
First test knowledge	1	0.3932	76.4475	0.0001
Grade point average	2	0.0310	6.2889	0.0135
Soil management experience	3	0.0338	7.4751	0.0073

The third null hypothesis, developed to ascertain if there was a difference in the attitudes of students toward the subject of soil management between the treatment groups was rejected. The results of the t test are reported in Table 2.

The t value of 7.035 was greater than the critical value of 1.980 at the .05 level of significance. A significant difference in the groups' mean scores was observed. The treatment group's mean score of 92.3 was significantly higher than the comparison group's mean score of 86.8.

CONCLUSIONS

1. The lecture/discussion method and the lecture/discussion method with a microcomputer component are equally effective in teaching secondary vocational agriculture students.

2. Student performance in the area of soil management can be substantially predicted using previous knowledge in the subject matter, grade point average, and soil management experience.

3. Students' attitudes toward subject matter are positively related to the use of lecture/discussion with a microcomputer component as compared to lecture/discussion instruction alone.

The results of this study have identified no specific advantage for incorporating microcomputer drill and practice activities when teaching vocational agriculture. However, the slightly higher score for the group receiving the drill and practice component may be an indicator that student achievement might be enhanced through extended use of microcomputers. In addition, it should be noted that microcomputer instructional programs could be used to individual instruction thereby freeing teacher time to work with additional groups of students. Additional studies should be conducted to assess the effectiveness of microcomputer instructional strategies in different classroom applications.

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MICROCOMPUTERS AND INSTRUCTION: USING A DRILL AND PRACTICE APPROACH

A Critique

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As the researchers in this study suggest, microcomputer use in the schools and agricultural education programs has become commonplace. However, some significant research questions still exist pertaining to the most appropriate and effective use of the microcomputer in instructional settings. This study focused on the comparison of a lecture/discussion strategy and use of the microcomputer in a drill and practice mode. Dependent variables included student achievement and attitude toward the subject matter. The researchers found that students in the microcomputer group reported a more positive attitude toward the subject matter, but no differences were found in student achievement.

This study dealt with a significant problem for teachers - a lack of basis for selecting instructional uses for a microcomputer. Several studies were cited which recommended further study of this problem. The purposes of the study were clearly stated and the research questions were stated clearly and concisely. The research design was appropriate for the problem and research questions posed. The researchers established the validity and reliability of the instruments used in the study, although the validity of the attitude instrument was not discussed. The summary data were presented in a concise manner, and statistical analysis techniques were appropriate, given the nature of the data and the objectives of the study.

The introduction of the paper could be improved by citing research findings that focus on the effectiveness of the microcomputer as an instructional device. The second null hypothesis should be restated to more accurately and clearly reflect the multiple regression null hypothesis. I found the procedures section of the paper to be somewhat confusing on several important points. Were individual students or groups of students randomly assigned to the treatment? A more detailed description of the treatment administered was also needed. The researchers described the treatment as lecture/discussion with a microcomputer drill and practice component, but students in this group were apparently removed from the discussion session. Was the technical content of the two groups identical? What are the potential sources of error in this research design and how were they controlled? Is 20 minutes with a computer enough time to make a difference? Was Cronbach's Alpha an appropriate procedure to use for estimating the reliability of the achievement tests?

The conclusions should be more carefully worded to prevent overgeneralizing the results and misleading the reader. Since data were collected from only 40 percent of the sample, what limitations are placed on the results of the study? I would like to see some recommendations for practice and further research included in the paper. The final paragraph of discussion seemed to go beyond the findings of this study. Finally, I was somewhat unclear as to the logical connection between the group comparison focus of the paper and the multiple regression analysis.

OPINIONS OF SCHOOL ADMINISTRATORS REGARDING SELECTED ASPECTS OF VOCATIONAL AGRICULTURE PROGRAMS

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INTRODUCTION

Agricultural Education has undergone a tremendous change in North Carolina during the past decade. This change has resulted in a quantitative decline of programs, teachers, and students. This reduction has been due in part to factors such as integration, consolidation, industrialization, a wider variety of vocational education offerings, better job opportunities for agricultural education teachers, the concept of local autonomy, and the national movement for excellence in education which limits the number of vocational credits many students may complete. While each factor has had its toll, studies by Webb (1959), Shinn (1976), Kimmons (1977), Clary (1977), Jewell (1979), and Jewell (1980) indicated that administrative support for vocational agriculture was still very positive.

In order to influence the changes occurring in education, emphasis needs to be placed on analyzing those factors which could have a negative effect on vocational agriculture and developing strategies for overcoming or improving situations which could be detrimental to vocational agriculture programs. Knowing that the concept of local autonomy allows local administrators to greatly influence their local educational programs, a need exists to collect data that portrays their perceptions toward their vocational agriculture programs.

PURPOSE AND OBJECTIVES

The purpose of the study was to determine if significant differences existed in attitudes of the local school administrators or if trends were occurring in perceptions of school administrators toward vocational agriculture programs that would warrant reconsideration of the organizational structure of programs and/or teacher preparation in agricultural education. More specifically, the research objectives were as follows:

1. To examine the opinions of local superintendents, principals, and vocational education directors toward selected aspects of vocational agriculture programs in North Carolina.
2. To determine if significant differences exist in the opinions of different types of administrators toward local vocational agriculture programs in North Carolina.
3. To compare the perceptions of 1985-86 school administrators with those of a similar study which was conducted during the 1978-79 academic year to determine if there has been a significant change in the opinions of the administrators during the seven year time period.

PROCEDURES AND ANALYSIS OF DATA

This study was designed to replicate a similar study which was done in North Carolina (Jewell, 1980) during the 1978-79 academic year. The population for this study consisted of all North Carolina public secondary school superintendents, vocational directors and principals during the 1985/86 academic year which had vocational agriculture as a part of their curricula. The 1985-86 North Carolina Vocational Agriculture Directory was used to identify the local education agencies which had vocational agriculture as a part of their curricula and served as the frame for the study. The research sample was randomly selected and consisted of 50 superintendents, 50 vocational directors, and 100 principals. The study sample was in excess of 33% of the population for each type of administrator.

A confidential 45-item survey instrument was used to collect the research data for both the 78-79 and 85-86 studies. It was a slightly modified version of an instrument originally designed and used by Webb (1959) and used in studies by Shinn(1976) and Kimmons (1977). Content validity of the instrument was assumed based on the acceptance of the instrument by professional educators.

Similar techniques were used for data collection for each of the studies. The instruments were mailed during the Fall semester of each school year with a cover letter and self-addressed return envelope. Nonrespondents were sent a follow-up letter three weeks after the initial mailing. A second follow-up letter was sent to nonrespondents three weeks after the first follow-up mailing. In 1978/79, 80% of the instruments were returned, including a 77% return from principals, an 82% return from vocational directors, and an 84% return from the superintendents. This compared to an overall return of 61.5% in 1985/86, made up of a 52% return by principals, an 86% return by vocational directors and a 56% return by superintendents. Based on a statistical comparison of the data, it was found that there was no significant difference in the data received from late respondents and that received from the initial respondents. Therefore,the data from initial and late respondents were combined for analysis. The data were analyzed using chi square statistics.

RESULTS

Administrators are in a position to determine to a large extent the purpose of instruction in the vocational agriculture program. There were significant differences in the opinions among the three groups of administrators ($p=.05$) in both 1978-79, $X^2=19.94$, (df = 8, C.V. = 15.51) and 1985-86, $X^2 = 24.79$, (df = 8, C.V. =15.51) concerning the controlling purpose of vocational agriculture programs. However, no significant differences were found when comparing the opinions of the administrators by group for the two time periods. While the three groups differed in their opinions regarding the controlling purpose of vocational agriculture, there was no significant change in opinions of either group over the seven year

Table 1.
Opinions of 1978-79 and 1985-86 School Administrators Concerning the Controlling Purpose of Vocational Agriculture Programs

	Principals		Superintendents		Directors		Combined Total	
Controlling Purpose	78-79 (N=78) %	85-86 (N=52) %	78-79 (N=42) %	85-86 (N=28) %	78-79 (N=40) %	85-86 (N=43) %	78-79 (N=160) %	85-86 (N=123) %
Train for employment in farming	7.6	3.9	14.3	14.3	2.5	9.3	8.1	8.1
Train for employment in agricultural occupations	56.4	44.2	66.7	39.3	87.5	74.5	66.9	53.7
Train for employment in any occupation	11.6	9.6	14.3	25.0	2.5	2.3	10.0	10.6
Provide general knowledge of agriculture	21.8	36.5	4.7	14.3	7.5	11.6	13.8	22.8
Other	2.6	5.8	0.0	7.1	0.0	2.3	1.2	4.8

time span between the two studies as to their perceptions of the controlling purpose. As reported in Table 1, the majority of all three types of administrators perceived the controlling purpose of vocational agriculture programs to be training for employment in agricultural occupations. However, the percentage of all administrators sharing this opinion decreased from 66.9% in 78-79 to 53.7% in 85-86. More principals indicated that the controlling purpose was to gain general knowledge of agriculture, 21.8% in 78-79 and 36.5% in 85-86, than either the superintendents or vocational education directors.

Approximately one third of the 85-86 school administrators in North Carolina felt a majority of the people in their communities regarded vocational agriculture as an essential part of high school education. Also, as reported in Table 2, in 1985-86 over half (55.3%) of the administrators indicated that it was their opinion that a majority of the people in their community regarded vocational agriculture as essential for persons concerned with agriculture. There were no significant differences between or among the groups (p=.05) concerning attitudes of the majority of people in their communities toward vocational agriculture.

Table 2.
Opinions of 1978-79 and 1985-86 School Administrators Concerning the Attitudes of the Community Toward Vocational Agriculture Programs

	Principals		Superintendents		Directors		Combined Total	
	78-79 (N=78)	85-86 (N=52)	78-79 (N=42)	85-86 (N=28)	78-79 (N=40)	85-86 (N=43)	78-79 (N=160)	85-86 (N=123)
Community Attitudes	%	%	%	%	%	%	%	%
Regard is as an essential part of education	53.8	30.8	26.2	35.7	45.0	30.2	44.4	31.7
Regard it as significant for persons concerned with agriculture	38.5	55.8	54.8	50.0	42.5	58.2	43.8	55.3
Indifferent toward program	7.7	13.4	19.0	14.3	12.5	11.63	11.8	13.0

There were no significant differences between or among the groups (p=.05) concerning the reasons students enrolled in vocational agriculture classes. As reported in Table 3, when asked to give their opinions on the primary reasons students enroll in classes of vocational agriculture, over 80 % of the administrators indicated that they felt the students were interested in occupations related to agriculture. Also, as reported in Table 3, in 1985-86 the primary reason given by the second largest percentage of administrators for students enrolling in vocational agriculture programs was the popularity of the teacher.

While there were no significant differences (p=.05) between or among the groups of administrators in their opinions concerning why students enroll in classes of vocational agriculture, there was a difference in the importance of the items as ranked based on opinions of administrators in 78-79 and 85-86. In 78-79 the priority ranking of the reasons given for students enrolling in vocational agriculture classes were, from highest to lowest: "interested in agricultural occupations," "they plan to be farmers," "popularity of teacher," "for training in agricultural mechanics," "to avoid other subjects," and "to become FFA members." In 85-86 the priority ranking was: "interested in agricultural occupations," " popularity of teacher," " they plan to be farmers," " to become FFA members," " to avoid other subjects," and "for training in agricultural mechanics."

Table 3.
Opinions of 1978-79 and 1985-86 School Administrators Concerning the Primary Reasons Students Enroll in Classes of Vocational Agriculture

	Principals		Superintendents		Directors		Combined Total	
	78-79 (N=78)	85-86 (N=52)	78-79 (N=42)	85-86 (N=28)	78-79 (N=40)	85-86 (N=43)	78-79 (N=160)	85-86 (N=123)
Reasons for enrolling	%	%	%	%	%	%	%	%
Plan to be farmers	50.0	44.2	52.4	42.9	55.0	51.2	51.9	46.3
Interested in occupations related to agriculture	88.5	80.8	76.2	71.4	85.0	88.4	84.4	81.3
Popularity of teacher	33.3	34.6	40.5	46.4	42.5	72.1	37.5	50.4
To become members of FFA	29.5	32.7	23.8	32.1	32.5	46.5	28.8	37.4
For training in agricultural mechanics	38.5	30.8	38.1	42.9	35.0	27.9	37.5	32.5
To avoid other subjects	32.1	32.7	33.3	42.9	30.0	32.6	31.9	35.0

Note: Respondents were allowed to select more than one reason.

As reported in Table 4, during both the 78-79 and 85-86 school years, 75% or more of each group of administrators indicated they believed that students received an adequate high school education when enrolling in four years of vocational agriculture. Even though there were no significant differences ($p = .05$) between or among the groups, and the percentages were small, fewer administrators in 85-86, (6.5%), indicated that they did not feel students received an adequate high school education when enrolling in four years of vocational agriculture than did in 78-79, (8.1%).

Table 4.
Opinions of 1978-79 and 1985-86 School Administrators Concerning Their Perceptions of Whether or Not Students Who Enroll in Vocational Agriculture for Four Years Receive an Adequate High School Education

	Principals		Superintendents		Directors		Combined Total	
	78-79 (N=78)	85-86 (N=52)	78-79 (N=42)	85-86 (N=28)	78-79 (N=40)	85-86 (N=43)	78-79 (N=160)	85-86 (N=123)
Responses	%	%	%	%	%	%	%	%
Yes	91.0	84.6	76.2	75.0	85.0	88.4	85.6	83.7
No	5.1	5.8	11.9	7.1	10.0	7.0	8.1	6.5
Undecided	2.6	7.7	9.5	10.8	2.5	2.3	4.4	6.5
Other	1.3	1.9	2.4	7.1	2.5	2.3	1.9	3.3

As reported in Table 5, the majority of the combined administrators, 55.6% in 78-79 and 63.4% in 85-86, perceived that vocational agriculture programs offer the necessary basic occupational preparation needed for youth to go immediately into farming after graduating from high school. The majority of the administrators , 53.8% in 78-79 and 62.6% in 85-86, also feel that their vocational agriculture programs offer the necessary basic occupational preparation needed for the students to go immediately into agriculturally related occupations after graduation from high school. While there were no significant differences (p=.05) between or among the groups regarding opinions of the administrators toward the necessary basic occupational preparation being provided the vocational agriculture students, there was a slightly higher percentage of administrators in 85-86 who felt the programs were providing the necessary preparation needed for entering, both, farming and agricultural related occupations than there was in 78-79. However, 28.5% of the superintendents in 85-86 compared to only 14.3 % in 78-79 indicated that they did not believe that their vocational agriculture programs were providing the necessary basic occupational preparation the students needed to go immediately into farming after graduation from high school.

Table 5.

Opinions of 1978-79 and 1985-86 School Administrators Regarding Their Perceptions Whether Vocational Agriculture Programs are Providing the Necessary Basic Occupational Preparation Needed for Students to go Immediately into Farming or Agriculturally Related Occupations Upon Graduation From High School

	Principals		Superintendents		Directors		Combined Total	
Responses	78-79 (N=78) %	85-86 (N=52) %	78-79 (N=42) %	85-86 (N=28) %	78-79 (N=40) %	85-86 (N=43) %	78-79 (N=160) %	85-86 (N=123) %
Farming:								
Yes	55.1	57.7	57.1	64.3	55.0	69.8	55.6	63.4
No	24.4	28.8	14.3	28.5	10.0	9.3	18.1	22.0
Undecided	17.9	13.5	23.8	3.6	27.5	18.6	21.9	13.0
Other	2.6	0.0	4.8	3.6	7.5	2.3	4.4	1.6
Agriculturally Related:								
Yes	47.4	55.8	59.5	64.3	60.0	69.8	53.8	62.6
No	28.2	23.1	14.3	17.8	15.0	9.3	21.2	17.1
Undecided	20.5	17.3	23.8	14.3	22.5	18.6	21.9	17.1
Other	3.8	3.8	2.4	3.6	2.5	2.3	3.1	3.2

There were no significant differences (p=.05) between or among the groups of administrators regarding their opinions toward the personal qualities of the teachers of vocational agriculture which needed to be improved. As reported in Table 6, "professional improvement" was the quality that all three groups of administrators indicated as being the personal quality of their vocational agriculture teachers that needed the most improvement. When observing the combined totals, it can be seen that while 30.6% of the administrators in 78-79 cited professional improvement as the personal quality of their teachers that needed the most improvement, even a larger percentage, 46.3%, cited the same quality in 85-86. In addition, a larger percentage of administrators in 85-86 than did in 78-79 cited "cooperation with administration," "cooperation with other faculty members," "and "grooming while in school" as being personal qualities needing to be improved. Fewer administrators in 85-86 than in 78-79 cited "cooperation with students," "cooperation with people in community," and "cooperation with other agricultural agencies" as being personal qualities which needed to be improved.

No significant differences (p = .05) were found between or among the groups of administrators regarding their perceptions of inadequate teacher qualifications. As reported in Table 7, "housekeeping of classroom and shop" was reported as the qualification of agricultural

Table 6.

Opinions of 1978-79 and 1985-86 School Administrators Regarding the Personal Qualities of Teachers of Vocational Agriculture Which Need to be Improved

	Principals		Superintendents		Directors		Combined Total	
Personal Qualities	78-79 (N=78) %	85-86 (N=52) %	78-79 (N=42) %	85-86 (N=28) %	78-79 (N=40) %	85-86 (N=43) %	78-79 (N=160) %	85-86 (N=123) %
Cooperation with administration	17.9	23.1	28.6	28.6	42.5	41.9	26.9	30.9
Cooperation with other faculty members	29.5	25.0	19.0	35.7	27.5	30.2	26.3	29.3
Cooperation with students	10.3	9.6	14.3	10.7	10.0	9.3	11.3	9.8
Cooperation with people in community	25.6	19.2	26.2	17.9	15.0	18.6	23.1	18.7
Cooperation with other agricultural agencies	24.4	17.3	9.5	17.9	20.0	14.0	19.4	8.1
Grooming in school	12.8	17.3	16.7	39.3	22.5	37.21	16.3	29.3
Professional improvement	30.8	40.4	26.2	53.6	35.0	48.8	30.6	46.3
Improvements not needed	23.1	26.9	19.0	7.1	17.5	18.6	20.6	19.5

Note: Respondents were allowed to identify more than one quality.

Table 7.

Opinions of 1978-79 and 1985-86 School Administrators Regarding the Subjects or Areas of Qualifications of Teachers of Vocational Agriculture Which Seem to be Inadequate

	Principals		Superintendents		Directors		Combined Total	
Qualifications	78-79 (N=78) %	85-86 (N=52) %	78-79 (N=42) %	85-86 (N=28) %	78-79 (N=40) %	85-86 (N=43) %	78-79 (N=160) %	85-86 (N=123) %
English-oral and written	23.1	17.3	28.6	28.6	27.5	32.6	25.6	25.2
Basic sciences	3.8	0.0	7.1	3.6	5.0	7.0	5.0	4.1
Technical agriculture	7.7	0.0	11.9	7.1	27.5	14.0	13.8	7.3
Agricultural mechanics	8.9	0.1	14.3	0.0	17.5	16.3	12.5	8.1
Discipline of students	21.8	26.9	23.8	17.9	17.5	23.3	21.3	23.6
Methods of teaching	21.8	28.9	33.3	35.7	27.5	34.9	26.3	32.5
Housekeeping of classroom and shop	39.8	48.1	71.4	53.6	67.5	65.1	55.0	55.3
Supervision of experience programs of students	16.7	11.5	35.7	28.6	32.5	18.6	25.6	17.9
Organizing young farmer and adult farmer classes	25.6	26.9	16.7	25.0	42.5	30.2	27.5	27.6
They are not inadequate	23.1	23.1	9.5	21.4	7.5	14.0	15.6	19.5

Note: Respondents were allowed to identify more than one qualification.

teachers most frequently cited by administrators as being inadequate. Approximately 55% of all the administrators cited housekeeping as being inadequate in 78-79 and 85-86. Though the increases were not significant, a larger percentage of administrators in 85-86 than in 78-79 cited the areas of "discipline of students," "methods of teaching," "housekeeping of classroom and shop," and "organizing young farmer and adult farmer classes" as being areas which they felt their teachers were inadequate. Fewer administrators in 85-86 than in 78-79 cited "English - oral and written," " basic sciences," "technical agriculture," and "supervision of experience programs of students" as being subjects or areas in which their vocational agriculture teachers seem inadequate.

CONCLUSIONS

To the extent that the facts obtained and the opinions expressed are accurate, and insofar as respondents are representative of the whole, the following conclusions may be drawn as of the time this study was made:

1. Administrators seemed to be in general agreement that the main purpose of Vocational Agriculture is to train high school students for gainful employment in agricultural occupations. This is in keeping with the philosophy of vocational education as the main purpose for the existence of vocational agriculture programs.
2. Administrators perceive that their communities consider vocational agriculture as important, especially for those students interested in an agriculturally related occupation. They also believe that those students who are truly interested in agriculture are the ones who take vocational agriculture courses.
3. Administrators also consider knowledge of agriculture and its importance in our society as an important aspect of vocational agriculture programs in addition to preparing students for employment in agriculturally related occupations.
4. Administrators perceive that vocational agriculture teachers need improvement in the areas of professional improvement, cooperation with administration, cooperation with other faculty members, and grooming while in school.
5. Administrators perceive that many vocational agriculture teachers are inadequate in the areas of housekeeping, discipline of students, methods of teaching, and organizing young and adult farmer classes.
6. Principals differ with superintendents and vocational education directors in that they perceive more of a need for vocational agriculture programs to be general in nature and to provide general knowledge of agriculture. The superintendents and vocational education directors express more of a philosophy that the programs should be vocational in nature.
7. In most instances the perceptions of the three types of school administrators remained the same in 1985/86 as they were in 1978/79. This would tend to indicate that the level of administrative support has not declined for vocational agriculture programs in North Carolina even though there is the national movement for excellence in education that would limit enrollment in vocational education courses for many students.

RECOMMENDATIONS

1. Considering the opinions expressed by principals, consideration should be given to increasing the number of general and/or introductory agricultural courses offered for the public schools. This might be best accomplished by expanding agricultural offerings to the middle and elementary grades.
2. Communication lines need to be developed and maintained between administrators and those concerned with agricultural education. Administrators should be kept attuned with such items as placement and curriculum and program changes.

3. Agricultural Education preservice and inservice programs should be sensitive to areas identified by administrators as being inadequate.
4. Similar studies should be conducted in other states and on a systematic basis.

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OPINIONS OF SCHOOL ADMINISTRATORS REGARDING SELECTED ASPECTS OF VOCATIONAL AGRICULTRUE PROGRAMS

A Critique

Frank Bobbitt, Michigan State University -- Discussant

This study was an attempt to determine the attitudes of school administrators in North Carolina about selected aspects of the vocational agriculture programs and to compare those opinions the same variables. The study was able to identify changes in attitudes of school administrators.

No statistically significant findings were discovered in this study. While there were differences between groups of administrators and between the groups in the two time periods, the difference was not enough to indicate a significant change in the attitudes of school administrators over the seven year span nor between the groups of administrators identified.

I thought it very instructive to find that only 31.7% of the school administrators felt their communities regarded vocational agriculture as an essential part of education in 1985-86 compared to 44.4% in 1978-79. More encouraging was the finding that only 6.5% felt that students who enrolled in vocational agriculture for four years received an inadequate education in 1985-86 compared to 8.1% in 1978-79.

The primary strength of the study is the ability of the author to compare a group of school administrators on the same set of variables over a span of seven years. The study made possible an analysis of the impact that changes in education and changes in the agricultrual industry have had on the attitudes of school administrators. The selection of the variables to be analyzed were very appropriate for the purposes of the study. Even though no statistically significant differences were found, the changes found between school administrator groups provides valuable insight to the dynamics of vocational agriculture as viewed by school administrators.

Chi square was used to analyze the data. The author explained in his narrative whether or not there were any significant differences found. However, no chi squares were given in the tables or the narrative so the depth of understanding of the statistical analysis was limited to what was reported in the narrative.

The sample was randomly sampled. However, the size of the population of each group was not given in the study. The author had a final 61.5% rate of return. While there was a follow up letter to non respondents and a comparison of late returners with early repondents, no attempt was made to do a telephone follow up with a small group of non respondents.

PEDAGOGICAL INSERVICE NEEDS AND ACTIVITIES OF POSTSECONDARY AGRICULTURE INSTRUCTORS

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INTRODUCTION

Faculty in postsecondary agricultural programs must be specialists in their technical area, but they also must possess a high degree of expertise in pedagogy or professional education skills. No current information existed regarding pedagogical (professional education) inservice needs of or available inservice activities for postsecondary agriculture instructors. Ayena (1982), Bellard (1980), Harmon (1980), Ingram (1978), and Lindahl (1977) have described characteristics, competencies and learning styles of postsecondary faculty in Wisconsin, New York, Ohio, Kansas, and Iowa, respectively. A national study by an ad hoc committee of the American Association of Teacher Educators in Agriculture (1979) relied upon coordinators of agricultural programs, rather than instructors themselves, to identify faculty professional education needs. None of the studies addressed the inservice needs of faculty or availability of inservice activities by type of institution.

PURPOSE AND OBJECTIVES

The primary purpose of this study was to determine the pedagogical inservice needs of postsecondary agriculture instructors in the United States. A secondary purpose was to determine the inservice activities available to the instructors. To achieve the overall purposes, the study attempted to accomplish the following specific objectives:

1. To determine pedagogical inservice needs of full-time and part-time postsecondary agriculture instructors in the United States by type of institution.
2. To determine the inservice activities available to full-time and part-time postsecondary agriculture instructors in the United States by type of institution.

PROCEDURE

After a review of literature a questionnaire was developed to ascertain information from postsecondary agriculture instructors. The four parts of the questionnaire were institutional information, instructor characteristics, pedagogical inservice needs, and inservice activities. Instructors were asked to rate a list of 118 pedagogical competencies regarding their need for inservice education for each competency. The rating scale was as follows: 1= no need, 2=somewhat needed, 3=needed, and 4=greatly needed. In addition, the instructors were asked to rate the availability of each 19 inservice activities at their institution. The rating scale was as follows: 1=virtually never available, 2=seldom available, 3=usually available, 4=almost always available. Subjects could mark "don't know" if applicable.

The questionnaire was field tested for content validity and clarity with six façulty and eight graduate students in the Department of Agricultural and Extension Education at The Pennsylvania State University. One of the faculty members and two of the students were former instructors in a postsecondary agricultural program. The questionnaire was revised slightly and pilot tested with 20 full- and part-time postsecondary agriculture instructors at Kirkwood Community College in Pennsylvania. Slight modification after the pilot test resulted in a final questionnaire with 118 pedagogical competencies and 19 inservice activities. The questionnaire was mailed to a stratified random sample of 430 instructors. Stratification was by type of institution and employment status of instructors (full- or part-time). The types of institutions in this study were as follows:

Type I -- institution offers postsecondary agriculture programs but awards less than the Associate degree.

Type II -- institution offers postsecondary agriculture programs and awards the Associate degree as the highest degree.

Type III -- institution offers postsecondary agriculture programs and awards, in addition to the Associate degree, Baccalaureate or high degrees.

The definitions of full-time and part-time instructors were as follows:

Full-time instructor -- a postsecondary agriculture instructor currently employed on a full-time basis and who teaches more than nine contact hours per term.

Part-time instructor -- a postsecondary agriculture instructor employed and paid on a term basis to teach up to nine contact hours per term who has taught at least one course in each of the last two academic years (1983-84 and 1984-85).

No list of instructors was available, therefore contact persons for agriculture programs listed in the Director of Two-Year Postsecondary Programs in Agriculture, Agribusiness, and Renewable Natural Resources Occupations (1984) from a random sample of 164 institutions or 30.7% of all institutions were asked to provide names and addresses of their full and part-time instructors. Four-hundred and thirty names of instructors were received from contact persons or coordinators of agriculture programs at 76 institutions offering postsecondary agriculture programs. A response rate of 71.2% was received. Of the questionnaires returned, 306 were usable (Type I, 59; Type II, 140; Type II, 107). Independent t-tests results revealed no significant differences between respondents and a random sample of non-respondents. A Cronbach Alpha reliability coefficient was calculated on each major competency area and on the total list of pedagogical competencies (r=.933). The Cronbach Alpha reliability value for the list of inservice activities was r=929.

ANALYSIS OF DATA

Data were coded and transferred into the computer for analysis using facilities at The Pennsylvania State University. The Statistical Package for the Social Sciences X (1983) was used to analyze data. Descriptive statistics were used to analyze and summarize background data of instructors. An independent t-test was used to determine significant differences between full-and part-time instructors. A one-way analysis of variance procedure and the Scheffe's Multiple Range Test were used to analyze differences among the three types of institutions regarding pedagogical inservice needs and availability of inservice activities. The criteria value for all tests of significance was set at the 0.05 alpha level.

RESULTS

PEDAGOGICAL INSERVICE NEEDS

A total of 118 pedagogical competencies was rated by the respondents. The "cut-off value" of 2.50 was judged to be the practical value for which respondents need inservice education based on a rating scale of 1= not needed, 2=somewhat needed, 3=needed, 4=greatly needed.

Table 1 shows a summary of competencies in major pedagogical competency areas received a mean rating of 2.50 or above. Twenty-six of the 118 competencies received a mean rating of 2.50 or above by respondents in Type I and Type II institutions. Only five of the competencies received such a rating by respondents in Type III institutions. Seventeen of the competencies received a mean rating of 2.50 or above by full-time instructors, compared to only 3 competencies for part-time instructors. The competency area of "public and human relations" contained the largest number of competencies with a mean rating of 2.50 or above by respondents in Type I and Type II institutions and by respondents who were employed on a full-time basis.

The rankings of the top 5 pedagogical inservice competencies received a mean rating of 2.50 or above are depicted in Table 2. The competencies "recruit students for agricultural technology program" and "teach students to think critically and independently" received the first and second highest mean rating by respondents in Type I and Type II institutions and by full-time instructors. The competency receiving the highest mean score rating by respondents in Type III institutions and part-time instructors was "teach with the aid of a micro-computer." Part-time instructors also perceived a need for the competency "evaluate one's own techniques and methods of teaching." Of the 118 pedagogical competencies, mean score ratings of 30 and 31 competencies by respondents in Type I and Type II institutions, respectively, were significantly different from mean score ratings of instructors in Type III insti-

Table 1. Summary of Competencies in Major Pedagogical Competency Areas Receiving Instructor Mean Ratings of 2.50 or Above by Types of Institution and by Instructor's Employment Status.

Major Pedagogical Competency Area	Institution Type			Instructor's Employment Status	
	Type I[a]	Type II[b]	Type III[c]	Full-time	Part-time
Planning for Instruction (N=14)	2	1	0	0	0
Teaching (N=23)	4	4	3	3	1
Evaluating Instruction (N=11)	3	1	0	1	1
Program Planning (N=10)	3	3	0	1	0
Guidance and Counseling (N=11)	1	1	0	0	0
Management (N=12)	1	1	1	1	0
Public and Human Relations (N=12)	6	9	1	8	1
Professional Role (N=9)	2	3	0	1	0
Student Organizations (N=8)	1	1	0	1	0
Coordination on-the-Job (CO-OP) (N=8)	3	2	0	1	0
Totals (N=118)	26	26	5	17	3

[a] Type I institution offers postsecondary agriculture programs but awards less than the Associate degree.

[b] Type II institution offers postsecondary agriculture programs but awards the Associate degree as the highest degree.

[c] Type III institution offers postsecondary agriculture programs & awards, in addition to the Associate degree, Baccalaureate or higher degrees.

Note: N refers to total number of pedagogical competencies.

Table 2. The Top Five Pedagogical Inservice Competencies (Items) Receiving a Mean Rating of 2.50 or Above.

	Institution Type						Instructor Employment Status			
	I[a]		II[b]		III[c]		Full-Time		Part-Time	
	Rank[d]	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank	Mean
1. Select and utilize a variety of teaching techniques and methods.	4	2.75								
2. Motive students to learn.	5	2.74			5	2.51	4	2.71		
3. Teach students to think critically and independently.	2	2.79	2	2.84	4	2.59	2	2.80		
4. Teach with the aid of a microcomputer.	3	2.79			1	2.81	5	2.69	1	2.57
5. Evaluate one's own techniques and methods of teaching.									2	2.57
6. Write grant proposals to obtain funds for agricultural programs.			3	2.83	3	2.67	3	2.76		
7. Interpret and promote technical education to the public.									3	2.52
8. Recruit students for agricultural technology program.	1	2.96	1	3.19	2	2.73	1	3.05		
9. Inform community of new developments in technical ag education through radio, newspapers, and television.			4	2.82						
10. Prepare and disseminate brochures and other descriptive materials on technical education.			5	2.76						

[a] Type I institution offers postsecondary agriculture programs but awards less than the Associate degree.

[b] Type II institution offers postsecondary agriculture programs but awards the Associate degree as the highest degree.

[c] Type III institution offers postsecondary agriculture program and awards, in addition to the Associate degree, Baccalaureate or higher degrees.

Note: Scale for inservice needs was 1=not needed, 2=somewhat needed, 3=needed, 4=greatly needed.

tutions. For only one competency, "direct individualized instruction," was there a significant difference between the perceived inservice needs of instructors in Type I and Type II institutions. Instructors in Type I institutions perceived a greater need for the competency.

AVAILABILITY OF INSERVICE ACTIVITIES

Objective two of the study was to determine the availability of inservice activities for instructors by type of institution. A total of 19 inservice activities was rated by the respondents. The rating scale was: 1=virtually never available, 2=seldom available, 3=usually available, 4=-almost always available and "don't know." The "cut-off value" of 2.50 was judged to be the practical value in which instructors might have the inservice activity available for meeting their inservice education needs. Inservice activities receiving a mean rating of 2.5 or above are found in Table 3.

The inservice activities "faculty orientation program" and "all-day program for full-time faculty" received the highest mean rating by instructors in Type I and Type II institutions. "Sabbatical leaves" received the highest mean rating by instructors in Type III institutions. Twelve of the 19 inservice activities received a mean rating of 2.50 or above by respondents who were part-time instructors. "Funding for attendance at professional meetings" received the highest mean rating by part-time instructors. It should be noted, however, that a much higher percentage of the part-time instructors marked "don't know" for all 19 inservice activities. Over two-fifths of the respondents who were employed on a part-time basis indicated "don't know" for nine of the 19 inservice activities. Of the 19 inservice activities, instructors in Type I institutions rated seven and instructors in Type II institutions rated six of the inservice activities significantly different from instructors in Type III institutions. No significant differences in perceived availability of inservice activities existed between instructors in Type I and Type II institutions.

RECOMMENDATIONS

1. Teacher educators in agriculture and members of professional organizations who intend to provide pedagogical inservice education for postsecondary agriculture instructors should consider the needs of instructors at institutions that award the Associate degree or less to be different from instructors in 4-year colleges and universities. Pedagogical competencies in the area of public and human relations should receive top priority.

2. Administrators of institutions that offer postsecondary agricultural programs should develop practices that will help part-time instructors evaluate their own techniques and methods of teaching and teach with the aid of a microcomputer. Part-time instructors may have additional pedagogical inservice education needs but don't perceive them because of emphasizing technical subject matter and performing few activities commonly performed by full-time instructors.

3. Supervisors of postsecondary agriculture instructors should make a greater effort to inform part-time instructors of available inservice activities at their institutions. Better communication appears needed between

Table 3. Inservice Activities Receiving a Mean Rating of 2.50 or Above.

		Institution Type			Instructor's Employment Status	
Item	Inservice Activity	Type I[a]	Type II[b]	Type III[c]	Full-Time	Part-Time
1	Faculty orientation program	2.95	2.97	2.72	2.86	3.09
2	All-day program for full-time faculty	2.96	2.79		2.61	3.06
3	Day or evening program for part-time faculty					2.86
4	Single-session workshop (teaching strategies)	2.74				2.78
5	Multi-session workshop/seminars	2.70			2.50	
6	Individual informal consultations	2.63	2.54	2.70	2.61	2.76
7	Formal growth contracts (individual development plan)					2.65
9	Personal interest/enrichment sessions (hobbies, travels)					2.53
10	Sabbatical leaves		2.62	3.17	2.74	2.89
11	Summer institutes	2.58				2.61
15	Financial support for graduate study					2.53
16	Funding for attendance at professional meetings	2.88	2.64	2.88	2.72	3.42
17	Visit to other campuses			2.55		
18	Institutional grants for instructional projects					2.71

[a] Type I institution offers postsecondary agriculture programs but awards less than an Associate degree.

[b] Type II institution offers postsecondary agriculture programs but awards the Associate degree as the highest degree.

[c] Type III institution offers postsecondary agriculture programs and awards, in addition to the Associate degree, Baccalaureate or higher degrees.

Note: Rating scale for availability of inservice activities was 1 = virtually never available, 2 = seldom available, 3 = usually available, 4 = almost always available.

part-time and full-time instructors regarding the availability of inservice activities.

4. The National Association of Colleges and Teachers of Agriculture and the American Association of Community and Junior Colleges should seek postsecondary agriculture instructors as members of their organizations. Other professional organizations may need to solicit instructors into their organizations. Professional organizations should consider offering more activities, including reports of research studies, teaching techniques, and update opportunities in technical agriculture areas, specific to the needs of postsecondary agriculture instructors.

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PEDAGOGICAL INSERVICE NEEDS AND ACTIVITIES OF POSTSECONDARY AGRICULTURE INSTRUCTORS

A Critique

Stacy A. Gartin, West Virginia University -- Discussant

The researchers, Harmon and Mortensen, are to be commended for conducting an interesting study of national scope. It certainly has implications for improving teaching in agriculture at the postsecondary level. The purpose of this study was to determine the pedagogical inservice needs of postsecondary agriculture instructors and inservice activities available to them.

Strengths

1. The introduction is concise and provides a theoretical basis for the development of the research problem.
2. The purpose and objectives have been clearly stated.
3. The authors used appropriate measures to determine validity and reliability of the instrument.
4. Appropriate statistics were used to analyze the data.
5. The results were presented in a concise manner with the use of table and narrative.

Weaknesses

Weaknesses found in the study perhaps resulted from restrictions on the number of pages allowed in the report. The following points are, therefore, raised as questions:

1. Were follow-up procedures of non-respondents used in an effort to increase your response rate? Was the contact person at each institution of any assistance in this process?
2. What time during the year was the sample sent the mail questionnaire? Could it be possible that the part-time faculty were not on campus?
3. The analysis of the data section states, "Descriptive statistics were used to analyze and summarize background data of instructors." Was background data collected and if so, why wasn't it included in the report?

In conclusion, I think the researchers have conducted an interesting study resulting in some interesting findings -- findings which may improve the quality of education in postsecondary institutions.

PERCEPTIONS OF VOCATIONAL AGRICULTURE STUDENTS AND TEACHERS ABOUT THE ROLE OF VOCATIONAL AGRICULTURE IN RURAL SCHOOLS

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INTRODUCTION

Local, state and national policy makers have found the delivery of educational services in rural areas increasingly challenging as rural populations have declined after a population surge in the 1970's as student numbers have declined reflecting a general trend in school populations, and as economic resources have become more scarce due to the worsening farm economy and the general decline in state revenues in many U. S. states. The problem is particularly acute at the secondary education level where increasing demands by the public and state agencies for expanded curricular options are focused. Rural schools are encountering formidable challenges as they seek to make advanced electives available to their youth and to provide a curriculum that serves all of their children - those who pursue further education and those who enter the work force after leaving high school (Thomas, 1987).

Study of the impact of the unique characteristics of rural schools on the educational and occupational aspirations of rural youth has not been widespread (Odell, 1986, p. 43). Rural schools have been characterized by their small sizes, sometimes depressed economic situations, inability to maintain balanced staffs, and difficulty in offering broad and varied curricula.

Rural schools typically have been subjected to the imposition of an urban reform model characterized by consolidation, centralization and standardization in a well-meaning but condescending attempt to improve the efficiency and quality of schooling. Thoughtful critics of such reform attempts have pointed out that the benefits achieved were bought at considerable price - a weakening of school-community ties, a subordination of agrarian values to business-industrial values, and the generation of social conflict. (Pohland, 1987)

Aspirations have been influenced by characteristics of individuals. They have also been influenced by factors which are beyond the control of the individuals making the choices. People (Ogunrinde, 1981), within the limits set by their native endowments, respond to the social structure within which they live to form various behavioral patterns that collectively constitute their personalities. The actual process of occupational choice is a compromise between a hierarchy of preferences and a hierarchy of expectations (p. 16).

Vocational agriculture has been the program for public school education in agriculture. Agricultural instruction must fit within the context of the entire school curriculum. Recent trends have resulted in scheduling problems for the traditional vocational agriculture curriculum. These problems appear to be more acute in small rural schools. It is increasingly difficult for rural youth to enroll in a course which provides the opportunity for them to develop a career interest in agriculture. This difficulty is expected to impact increasingly upon enrollment in higher education in agriculture. Agricultural students, scholars, leaders and workers will need to be recruited and educated. There will not be enough people to fill this need who will have been raised on farms.

Agriculture is changing. In the year 2000 (Lennon, 1983) one percent of the farms may produce 60 percent of the agricultural production. The business and industry of agriculture (McCracken & Newcomb, 1981) both on and off the farm, will increasingly become more technological, more specialized, more business-oriented, and more efficient. More part-time farmers will be "living on a little land." The consuming public will have little direct knowledge of agriculture.

How can rural communities provide the type of education needed by youth? What curriculum patterns assist students in developing a career interest in agriculture, and still provide the academic rigor demanded by society? What influences students as they make educational decisions and occupational choices? What constraints inhibit rural schools in attempting to meet the educational needs of rural youth?

PURPOSES AND OBJECTIVES

The major purpose of this study was to describe the perceptions of vocational agriculture teachers and students about the changing role of vocational agriculture in rural communities. Specific objectives were to: (1) describe the overall school curriculum of students enrolled in vocational agriculture. (2) describe reasons given by students for their vocational agriculture enrollment, (3) identify scheduling problems, (4) describe the image held of vocational agriculture students by others in school, (5) identify vocational agriculture students after graduation expectations, and (6) describe the nature of support for vocational agriculture in rural communities.

PROCEDURE AND ANALYSIS OF DATA

Qualitative research methods were used in this descriptive study. This study was part of a larger effort to examine the changing nature of the curriculum for public school education in agriculture. Personal interviews were conducted during the 1984-85 school year with twelve randomly selected students and the vocational agriculture teacher in each of four randomly selected schools in Ohio.

These four schools represented four different geographical regions within the state of Ohio. Because of the small number of schools selected, representativeness of the entire state may be questioned. However, the selection process did provide a sample free of bias. Community leaders described their communities as another part of the larger study. In all of these school districts, the role of the school in the community was extremely important. Many leaders felt that if the school was further consolidated, the community could not survive. The school was the primary employer and the center of social activities. Community groups met in the school for their functions. All of the districts had limited employment opportunities for youth and for adults. Many of the young people left the community for employment.

Open-ended questions were used in the interviews to encourage free discussion by the respondents relating to the questions. Probing questions were used for clarification or to obtain the reasoning behind responses. Each interview lasted about 30 to 40 minutes. Content analysis techniques were used to summarize the results.

RESULTS

Summaries of student responses indicated that approximately 20% of the students enrolled in vocational agriculture were following a college preparatory curriculum. The remainder of the agriculture students were largely in either general or vocational curriculums.

A variety of reasons were given by the students for undertaking their schedule of courses. Forty percent of the respondents indicated that meeting graduation requirements was their reason for selection of courses. Approximately 17% of the agriculture students stated that preparation for college was their objective. Other reasons noted by several students included interest in the courses they were taking and ease of coursework. Infrequently mentioned reasons given by students for taking the classes they were in were that the courses would help them in the future, the students were placed in the courses and the counselor suggested the student's current schedule.

Several persons were recognized by the students for assisting them in selecting courses. Those most frequently identified were guidance counselors, indicated by 50% of the students and parents, indicated by 40% of the students. Also mentioned as assisting in course selection were friends and teachers.

The principle reason given by students for enrolling in vocational agriculture was that they currently lived on a farm or had lived on a farm (40% of the respondents). Interest in agriculture, interest in farming and opportunities to do shop work were each given as reasons for taking vocational agriculture by 10% - 15% of the respondents. Other reasons mentioned included to learn about farm jobs, expecting to become a farmer, to gain experience, to learn about animals, to meet people, to work outdoors and to escape courses that are mainly lecture. Over 50% of the students questioned selected vocational agriculture as their favorite class. There was, however, a great deal of variance by school in the response to this question.

About 17% of the students enrolled in vocational agriculture had some difficulty in scheduling the class. Variance among schools was noted for this question also. Problems with scheduling were generally rectified by switching the times of scheduled classes. It was noted by both teachers and students that the greatest scheduling conflict was with college preparatory curriculums. Innovative ways, such as independent studies, were being used to enable college-preparatory students to continue in vocational agriculture.

The perception of vocational agriculture students varied by school but a general description may be developed from the various responses. The majority of vocational agriculture students were described as being from farms and having an interest in agriculture. This included a desire to learn about animals, crops and mechanics. In addition to these interests, these students were perceived as being enrolled in vocational agriculture in order to have the opportunity to do shop and lab work, be able to participate in FFA activities and meet people, to learn about various agricultural industries and agribusiness and to have what they considered to be relatively easy course work. Few of the agriculture students were considered to be "academic students" and it was felt that, for some, taking agriculture was their principle purpose for coming to school.

Personal traits most often attributed to vocational agriculture students included willingness to work, friendliness, helpfulness, concern for others and self-sufficiency. Agriculture students were characterized as tending to socialize more together but were not very different from any of the other students. It was noted that agriculture students are as varied as the general student population.

Vocational agriculture students expressed a variety of expectation for pursuits after graduation. The largest percentage of respondents (20%) planned to attend a college or university to pursue a degree in a field other than agriculture. Nearly 12% of the students interviewed planned to attend college and major in some field of agriculture. Nearly one-fifth of the students (19%) planned to enter farming full-time. The plans, each indicated by seven percent of the students, included farming part-time while working another job, entering the military, attending a technical school and working in agribusiness. Nearly all of the remaining students planned to seek jobs as craftsmen, in trades or as general laborers. Most had no specific job objective in mind however. A small percentage of those questioned were undecided about their plans following high school.

Degree of support for the vocational agriculture program in the community varied among school but was perceived as ranging from good to excellent. Community-wide support for the agriculture program was generally perceived as being present, with some communities displaying excellent support through contributions to the vocational agriculture and FFA programs. Examples of these contributions included award sponsorships and providing for activities such as field trips. It was noted that even in those areas with average program support community members would help if asked to do so.

Several groups in particular were recognized for supporting the vocational agriculture program. By far, the most frequently mentioned were the young farmer organizations in the communities. Also reported as assisting the agriculture programs were FFA alumni groups, agribusinesses, civic clubs and teachers in the school.

CONCLUSIONS

Students enrolled in vocational agriculture for many different reasons and expected to use their vocational agriculture background in the future in many different ways. Most students rated vocational agriculture as one of their favorite subjects, but had differing reasons for giving it a high rating. Scheduling of agricultural course work was only a problem for the college preparatory students. A challenge to program developers is the design of a program which will enable college preparation and enrollment in a high school program which would further develop students' interests in agriculture.

Vocational agriculture students were perceived to be less academic than the general student body but were characterized as having traits allowing them to compensate for this (i.e. hard working, self-sufficiency). A greater percentage of these students planned to enter college than full-time or part-time farming. However, nearly one-half of the students interviewed planned to be involved in some aspect of agriculture following graduation.

It was determined that support for vocational agriculture programs varies by community and ranges from good to excellent. Principle support for the programs is from young farmer groups and agribusinesses.

This study on vocational agriculture students and programs provided baseline data for a future panel study involving these same students after they have graduated from high school and entered further education or the work force. The longitudinal study will determine the extent to which expected education and occupations are actually attained. Future studies will also observe changes in curriculum and enrollment patterns of future students in these same rural schools.

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PERCEPTIONS OF VOCATIONAL AGRICULTRUE STUDENTS AND TEACHERS ABOUT THE ROLE OF VOCATIONAL AGRICULTURE IN RURAL SCHOOLS

A Critique

Frank Bobbitt, Michigan State University -- Discussant

This study was unique. The author has attempted to determine the perceptions of students and teachers about the role of vocational agriculture in rural schools. The uniqueness of the study was the identification of the population to be studied as rural high schools and the method of investigation used to obtain data as the interview technique.

It is significant that guidance counselors and parents were the groups of individuals who most often assisted students in their selection of vocational agriculture as a course to take. This would seem to indicate that teachers involved in recruiting new students into their program should consider techniques that get their message to counselors and parents.

The author used the previous reasearch done in the field as a point of departure in the study. The review of literature helped to narrow the scope of the study and point out the need for investigation. The use of the interview technique should have provided the opportunity for in depth data collection that the usual reliance on mail survey could not duplicate. Also the reporting of the results of the study in means and narrative description was a welcome techinque to keep the interest of the reader.

In the paper there was no discussion of the technique used to develop the interview schedule. Thus, we have to assume the instrument was valid for collecting the information. A bit of discussion on the instrument itself would have made the paper clearer.

The conclusions reached were more a summary of the results than conclusions of what could be derived from the study. The inclusion of a set of recommendations arising from the conclusions would have been informative.

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SOE PROGRAMS IN ILLINOIS - TEACHER PHILOSOPHIES AND PROGRAM CHARACTERISTICS

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INTRODUCTION

Many professionals in agricultural education believe that the purposes of vocational agriculture in the secondary schools cannot be accomplished without supervised occupational experience (SOE) programs. At the same time, there is a growing concern that SOE programs are declining in quality and quantity. Lee (1982) described his fear that SOE programs, as a cornerstone in vocational agriculture, are "slipping away". Several recent studies have supported this concern. In New York over one-half of the vocational agriculture students in each grade level did not have SOE programs (Berkey and Sutphin, 1985). In the same study fifty percent of the teachers reported a high or medium need for additional competence in directing SOE programs. "The evidence continues to accumulate which reveals that many programs are not fully utilizing SOEP and many students are not becoming involved" (Miller, 1984, p.3).

Teachers play a critical role in the success or failure of students' SOE programs. Length of contract, number of supervisory visits, and teacher attitudes toward the SOE concept have been found to have a positive influence on the quality and scope of SOE programs (Arrington and McCracken, 1983; Case and Stewart, 1984; Reneau and Roider, 1986).

Continuing changes in student backgrounds and interests, high school course patterns and curricula, and the agricultural teacher corps in Illinois have caused agricultural educators to loose track of the health and status of SOE programs in Illinois. Accurate, up-to-date data describing the trends in SOE programs in Illinois were needed to address the concerns of declining SOE program quality and student participation.

PURPOSE AND OBJECTIVES

The purpose of this study was to describe the current status of SOE programs in Illinois and examine teacher attitudes and philosophies toward supervised occupational experience. The following research questions provided focus for the study:

(1) What were the attitudes and philosophies of Illinois vocational agriculture teachers regarding supervised occupational experience programs?

(2) What was the nature of SOE programs conducted by Illinois vocational agriculture students?

(3) What was the relationship between teacher attitudes toward SOE and selected demographic characteristics of teachers?

(4) What differences in SOE philosophy existed when teachers were grouped according to selected demographic characteristics?

The research design implemented in the study was classified as descriptive correlational. The target population included all full-time Illinois agricultural production teachers in 1986-87 (N = 320). The LOTUS 1-2-3 spreadsheet program was used to select a simple random sample of 100 teachers, or 31 percent of the population. The sample size was determined by using a formula suggested by Elliott (1980). Using a response scale range of four, an accuracy level of 10 percent (acceptable difference between the population mean and sample mean), and confidence level of 95 percent, the needed sample size was calculated to be 100. Data were collected by use of a mailed questionnaire. Field testing and pilot testing resulted in several modifications in the survey instrument. A group of five graduate students and faculty provided feedback on the organization and clarity of the instrument. A panel of experts in agricultural education judged the instrument to have content validity. Ten purposefully selected agricultural teachers provided pilot test data. A Cronbach's Alpha reliability of r = .89 was calculated for the 27 item teacher philosophy scale contained in the final instrument.

After three follow-up mailings a response rate of 79 percent had been attained. However, two of the returned questionnaires were incomplete, resulting in a 77 percent usable return. All returns received one week or later after the first follow-up mailing were classified as late respondents. Research has shown that late respondents are similar to nonrespondents, and a comparison of early and late respondents can be performed to allow generalization of the findings to the target population (Miller and Smith, 1983). The 57 early respondents were compared with the 20 late respondents on the primary dependent variable, teacher philosophy of SOE programs. The t-test indicated no significant difference between the two groups. Thus, the results of the study were generalized to the target population under study.

ANALYSIS OF DATA

Descriptive statistics were used to summarize and analyze the data. Possible relationships between variables were examined using Pearson and point biserial correlation coefficients. Group means were compared using t-tests and one-way ANOVA, as appropriate. The Scheffe procedure was used to identify significantly different group means as a follow-up to the ANOVA procedure. All hypotheses were tested at the .05 level.

RESULTS

Teacher Characteristics

Agricultural production teachers in Illinois were located in relatively small schools; one-half of the teachers were in schools of 240 students or less. The median number of agricultural students per school was 41, while the median number of FFA members was 32. On the average, teachers reported that 44 percent of their students lived in a city or town, 23 percent lived in a rural area but not on a farm, and 33 percent lived on a farm.

Nearly all of the teachers had taken agriculture in high school, and 71.1 percent had completed four years. A large majority (84.4 percent) of the teachers participated in SOE as a high school student. Nearly all of the teachers' SOE programs completed as high school students were limited to livestock and crop production. Eight of every ten teachers were FFA members in high school.

The average number of years of teaching experience was 11.67 years. Only 13 percent had completed an undergraduate or graduate course on SOE programs. Of the 31.2 percent of the teachers that prepared an annual summary of SOE programs, 75 percent shared a copy with school administrators. However, only 23.4 percent of all teachers shared a copy of an annual SOE summary with their school administrators. Two-thirds of the teachers reported having an unlimited annual travel budget. Only 11.7 percent of the teachers reported having a daily period provided for SOE supervision. Extra credit toward graduation for SOE programs was reported by 42.9 percent of the teachers, with 1/4 to 1/2 units per year being most often reported. The percentage of teachers with each contract length was as follows: 9 month - 26.3 percent, 10 month - 31.5 percent, 11 month - 35.4 percent, and 12 month - 6.8 percent.

Nature of SOE Programs

Nearly 40 percent of the agricultural production teachers in Illinois did not require students to complete SOE programs. For those teachers that did require SOE programs, 36.8 percent required ownership or placement projects, and approximately one-half required improvement practices or supplementary skills. On the average, 42 percent of the teachers reported having no minimum standards or scope guidelines for the major types of SOE programs. Sixteen percent of the teachers reported teaching nonvocational agriculture courses, and nearly all of these teachers did not require SOE programs for students in these courses. A slight majority (51.3 percent) of the teachers counted SOE programs as a portion of the students' grade in vocational agriculture. Most of these teachers allotted 10 percent of the grade for SOE programs. The average percentage of students conducting SOE programs is shown in Table 1.

Table 1
Percentage of Students Having SOE Programs by Grade Level

Grade	Percent
9	84.4
10	79.8
11	76.5
12	71.5

Although only 33 percent of students lived on a farm, nearly 60 percent of the students conducted SOE programs involving livestock or crop production (see Table 2).

Lack of student motivation was most often cited by teachers as the major problem encountered when helping students plan and conduct SOE programs. Other problems included limited student opportunities, inadequate financial resources and facilities, lack of teacher time, low parent interest, poor student record keeping practices, and students not completing SOE programs once they were undertaken.

Table 2

Percentage of Students Conducting Various Types of SOE Programs

SOE Type	Percentage of Students
Away from school	
productive enterprises	59.3
business ownership	5.9
farm placement	8.3
ag business placement	11.5
School-based	11.5

Teacher Philosophies

Teachers responded to a set of 27 Likert-type items (1 = strongly disagree, 5 = strongly agree) that sought to describe their philosophies toward SOE programs. Mean responses ranged from 2.07 to 4.47 (see Table 3). The overall mean score for the teacher philosophy scale was $\bar{x}$ = 3.79 (SD = .465). Teachers were found to be very supportive of the SOE concept and indicated that SOE is a valuable component of vocational agriculture today. Teachers also found their work with SOE programs to be very rewarding ($\bar{x}$ = 4.33). They enjoyed conducting on-site visits ($\bar{x}$ = 4.31) and felt that SOE programs should primarily seek to provide firsthand occupational experience in agriculture ($\bar{x}$ = 4.33). As a group, teachers also felt that on-site supervisory visits are essential, and that students should receive extra credit for conducting SOE programs.

Teachers reported considerable difficulty in motivating students to participate in SOE programs. School facilities and resources for conducting SOE programs were viewed as inadequate. Teachers also felt that their SOE knowledge base needed improvement. Finally, teachers agreed that worthwhile SOE programs can be completed on school-owned or managed property ($\bar{x}$ = 4.00).

As the percent of students living in town increased, teachers' SOE philosophy scores tended to decrease (see Table 4). On the other hand, as the percent of students living on a farm increased, teachers' SOE philosophy scores also tended to increase. All other relationships were found to be negligible.

A number of t-tests were computed to analyze differences in means when teachers were grouped by selected demographic variables. However, no significant differences in mean SOE philosophy score were found between (1) teachers who completed a bachelor's degree in agricultural education and those whose major was in another field ($\underline{t}$ = 1.23, p =.22), (2) teachers who completed graduate courses in SOE programs and those who did not ($\underline{t}$ = .87, p = .39), and (3) teachers who participated in SOE workshops and those who did not ($\underline{t}$ = .41, p = .68). Furthermore, no differences were found in mean SOE philosophy score when teachers were grouped according the types of courses taught in their program (eg., horticulture, agribusiness management, etc.).

Table 3

Means and Standard Deviations for Items on the Teacher SOE Philosophy Scale*

	$\bar{x}$	SD
1. SOE is a valuable component of vocational agriculture programs today.	4.47	.754
2. All students with SOE programs should be required to keep records on their program.	4.42	.714
3. I find my work with students' SOE programs to be very rewarding.	4.33	.616
4. The most important aspect of the SOE program is that it provide firsthand occupational experience in some area of agriculture.	4.33	.595
5. I enjoy conducting on-site SOE supervisory visits.	4.31	.674
6. I am philosophically very supportive of the SOE concept in vocational agriculture.	4.30	.844
7. The SOE concept is still workable in today's vocational agriculture programs.	4.25	.948
8. I strongly promote SOE programs in my vocational agriculture classes.	4.20	.932
9. It is necessary for the teacher to conduct on-site SOE supervisory visits.	4.14	.838
10. I am very confident in my ability to help students plan and carry out worthwhile SOE programs.	4.05	.872
11. Extra credit toward graduation should be provided for students completing SOE programs.	4.05	.944
12. Worthwhile SOE programs can be completed on school-owned or managed property.	4.00	.743
13. Good SOE programs can be conducted by most, if not all, students enrolled in vocational agriculture courses.	3.99	1.045
14. Every SOE program should include improvement projects and supplementary skills.	3.90	.940
15. SOE programs should require student activity or involvement for most of the year.	3.88	.888
16. I often use real problems encountered by students in their SOE programs as topics for classroom instruction.	3.83	.750
17. My students understand the link between classroom and laboratory instruction and SOE programs.	3.79	.732
18. All vocational agriculture students should be required to conduct a SOE program.	3.74	1.332
19. Teachers should establish minimum standards for the scope of individual SOE programs.	3.73	.912
20. I feel I am well organized with respect to SOE teaching and supervisory activities.	3.52	.940
21. Overall, the quality of my students' SOE programs is very good.	3.47	1.059
22. Every SOE program should include ownership or placement projects.	3.40	1.042
23. Helping every student plan and conduct a SOE program is very difficult.	3.31	1.195
24. All SOE programs should be planned with a potential for profit.	3.23	1.111
25. My knowledge base in SOE program design and implementation is adequate.	2.91	1.028
26. I have little difficulty motivating my students to conduct SOE programs.	2.74	.134
27. Schools provide adequate facilities and resources for students to complete SOE programs.	2.07	.879

*5=strongly agree, 4=agree, 3=neutral, 2=disagree, 1=strongly disagree

Table 4

Pearson Correlation of Teacher SOE Philosophy With Selected Demographic Variables

Variable	*r*
1. number of ag students	-.08
2. number of FFA members	.13
3. percentage of students from town or city	-.26*
4. percentage of students from rural areas but not a farm	.05
5. percentage of students from farms	.24*
6. years of high school ag completed	.10
7. years of teaching experience	.06
8. FFA membership in high school	.09
9. undergraduate hours completed on SOE	-.12
10. graduate hours completed on SOE	-.09

* $p<.05$

Finally, one-way analysis of variance was performed to examine the differences in teacher mean SOE philosophy score when grouped according to length of teaching contract (see Tables 5 and 6).

Table 5

Means and Standard Deviations of Teacher SOE Philosophy Score by Contract Length

Contract	n	$\bar{X}$	SD
9 months	20	3.60	.413
10 months	24	3.77	.350
11 months	27	3.89	.524
12 months	5	4.27	.297

Table 6

Analysis of Variance of Mean Teacher SOE Philosophy Score By Contract Length

Source	df	*SS*	*MS*	F
Between groups	3	2.200	.733	3.90*
Within groups	72	13.550	.188	
Total	75	15.750		

*$p<.05$

Results of the analysis of variance indicated a significant difference between the mean scores in two or more groups. The Scheffe post-hoc analysis revealed that teachers with 12 month contracts had significantly higher mean SOE philosophy scores than teachers with 9 month contracts.

CONCLUSIONS AND RECOMMENDATIONS

1. A large majority of Illinois agricultural production teachers have limited formal training in providing SOE programs. In general, teachers tended to report a the need to strengthen their SOE knowledge base. Teachers are facing problems with low student motivation, lack of student resources, and lack of teacher time to provide high quality SOE programs. Teacher education programs should provide preservice and inservice experiences to students that are aimed at building teachers' SOE knowledge base and expertise and solving problems associated with SOE programs.

2. Illinois agricultural production teachers are very supportive of the SOE concept and believe that most students can conduct worthwhile SOE programs. Nevertheless, a large number (40 percent) of Illinois teachers do not require SOE programs, and those that do are uncertain of appropriate standards or scope guidelines. Inservice activities should build upon teachers' belief in SOE programs while offering solutions to major problems in implementing the SOE concept. Inservice programs should help teachers transform their supportive SOE philosophy into enthusiastic implementation of the SOE concept.

3. Most Illinois high school agricultural students have SOE programs, but the percentage of students with SOE programs steadily declines from 84 percent to 71 percent as students move from their freshman to their senior year. Teachers should be encouraged to expand students' involvement in SOE programs as they extend their study in agriculture.

4. A large majority of Illinois teachers were FFA members in high school and completed a SOE program. However, nearly all of their personal experiences were limited to livestock and field crop production. In addition, most of their students have productive enterprises for their SOE programs a limited number of students' SOE programs involve business ownership, placement, or school-based experiences. Teacher educators and state supervisors need to work with local teachers and administrators to identify strategies for providing expanded SOE opportunities for students.

5. In general, teachers do not prepare an annual summary of SOE programs and share a copy with their school administrators. A concise, meaningful SOE summary report form should be developed by state leaders and given to teachers for their use. The informational and public relations benefits of such a report should be clearly cited.

The following areas of further study are also recommended:

1. Factors that lead to decreased student participation in SOE programs as students advance to the upper grades need to be identified and examined.

2. Methods of overcoming the primary problems encountered when providing SOE programs need to be further researched.

3. Appropriate standards or SOE scope guidelines need to be established through pilot projects.

4. The short term and long term benefits of SOE program participation by students needs to be continually examined.

5. Strategies for helping teachers establish a variety of school-based SOE experiences for their students need to be identified and implemented.

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SOE PROGRAMS IN ILLINOIS - TEACHER PHILOSOPHIES AND PROGRAM CHARACTERISTICS
A Critique

George W. Wardlow, University of Minnesota -- Discussant

The summary of the study of SOE programs in Illinois was a pleasure to read for both the findings presented and the style in which it was written. The author is to be commended for his ability to present research. The findings serve to further illustrate the factors associated with this important component of vocational agriculture programs.

The introduction provided a good background for a clearly stated problem and the research questions. The research procedures were generally found to be appropriate for this type of study. The research design was correctly identified, as were the population and sample procedures. A validated survey instrument, the reliability of which was appropriately estimated, was utilized to collect the data. Appropriate statistical procedures were used to address the research questions.

The results were clearly presented. While several of the findings were discouraging, few were surprising. Few professionals in agricultural education would take issue with the major findings. The study is important in the sense that it provides excellent support for previously held contention. We have long held that teacher attitude toward any factor is associated with student performance on that factor. We have also long contended that length of teacher contract is associated with success of SOE programs. This study begins to illustrate these beliefs.

A review of the research report leaves several questions unanswered which would serve to strengthen and clarify the study. How is the term "conducting an SOE" defined? What constitutes an SOE program? To be included in the study, what is the minimum acceptable duration of an SOE during a student's tenure in the educational program? It is granted that a 77 percent return for a survey is an acceptable rate, but was any provision made to follow up and assess non-respondents? A discussion of late respondents is provided.

The researcher utilized what is presumed to be a grand mean of scores on the teacher philosophies instrument to indicate some overall rating. This score is then used to calculate relationships with selected demographic data to address the research questions. The use of this measure might have been strengthened if a factor analysis of the instrument had been done to identify items specifically related to the factor in question.

The conclusions and recommendations are well written and are logically derived from the analyses. Once again, the researcher is to be commended for the importance of the study.

TEACHER PRESAGE VARIABLES AND QUALITY SUPERVISED OCCUPATIONAL EXPERIENCE: IS THERE A RELATIONSHIP?

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INTRODUCTION

In recent years, SOE has developed into an increasingly important concern throughout the profession. Research findings demonstrate that teachers are not integrating SOE with other components of the vocational agriculture program (Miller, 1980; Berkey and Sutphin, 1983; McCracken and Barrick, 1985). In most instances, the focus of these studies has been SOE in agricultural production.

Dickerson (1984) questioned whether or not we have "overemphasized production agriculture in our deliberation about SOE to the exclusion of some of the more recent additions to our curriculum such as natural resources, ornamental horticulture, or agricultural sales and service occupations?" (p.5). The limited research addressing SOE in horticulture suggests that this may indeed be the situation. Furthermore, SOE research findings that have been reported in the occupational area of horticulture warrant professional concern.

Berkey and Sutphin (1983) found that some horticulture teachers in New York do not consider their program to be part of vocational agriculture. This being the situation, the status of SOE in these programs is somewhat suspect. Burnett and Smith (1983) conducted a nationwide study of horticulture programs and found that only 58 percent of the respondents reported teaching a unit on supervised occupational experience. In an Arizona study, Zubrick (1984) reported the curriculum area of horticulture had the highest percentage of students enrolled who were not conducting any type of SOE program (20 percent).

One crucial aspect of success of the SOE program is certain to be the teacher. This study attempted to explain the variability in the quality of supervised occupational experience in Ohio horticulture programs through an investigation of the variations in teacher presage variables. The conceptual framework for the study was derived from models of classroom teaching and learning (Dunkin and Biddle, 1974; McDonald and Elias, 1976) with an emphasis on teacher presage variables, i.e., characteristics of teachers.

PURPOSE AND OBJECTIVES

The quality of supervised occupational experience in vocational horticulture programs in Ohio had not been researched. More important, those teacher presage variables that might explain the variance in the quality of SOE remained highly speculative. The purpose of the study was to investigate the relationship between teacher's attitude toward SOE and the quality of supervised occupational experience in Ohio's horticulture programs.

The objectives of the study were:

1. To determine the attitudes of vocational horticulture teachers toward SOE.

2. To assess SOE quality in horticulture programs.

3. To determine the relationship between the teacher's attitude toward SOE and the quality of supervised occupational experience in horticulture programs.

4. To determine the relationships between selected teacher presage variables and SOE quality horticulture programs.

5. To determine the proportion of variance in the SOE quality of horticulture programs that can be explained by the attitude of the teacher toward SOE.

6. To determine the proportion of variance in the SOE quality of horticulture programs that can be explained by selected teacher presage variables.

PROCEDURES

The research methodology was ex post facto with attitude of the teacher toward SOE the main independent variable. Six alternative independent variables were also investigated: teacher perceptions of their SOE knowledge, teacher perceptions of administrator support for SOE, length of teaching experience, method of certification of the vocational horticulture teacher, number of years the teacher had taken vocational agriculture as a student in high school, and the number of years in which the teacher conducted a SOEP while in high school.

SOE quality, the dependent variable of the study, was assessed through a paired comparison analysis. The comparisons between all pairs of teachers within a supervisory district were made on a single component of the teacher's overall responsibilities, i.e., supervised occupational experience. Paired comparisons were made by the respective area supervisor on the construct SOE quality. Frequency counts were converted to standard T-scores for data analysis. Essentials of the method of paired comparisons as outlined by Guilford (1954) were implemented.

An a priori decision was made to exclude teachers from the SOE quality assessment in programs designated "special needs." The concensus among area supervisors and special needs teachers was that quality comparisons between teachers in special needs programs and teachers in traditional programs would be difficult to make and inherently biased.

INSTRUMENTATION

Data were collected via a mail questionnaire. Content validity of the instrument was established by a panel of experts. Reliability of the instrument was determined through a pilot test using vocational horticulture teachers in Pennsylvania. The Cronbach standardized item alpha coefficients for the three parts of the instrument were .87, .83, and .81.

Respondents indicated their degree of agreement with each of the items regarding attitude toward SOE, perceptions of SOE knowledge, and perceptions of administrator support on the following Likert-type scale: (1) strongly disagree; (2) disagree; (3) slightly disagree (4) slightly agree; (5) agree; and (6) strongly agree. The resulting mean scores were interpreted using the values shown on the researcher-devised scale that follows:

Scaling used to interpret results

Strongly Negative	Negative	Slightly Negative	Slightly Positive	Positive	Strongly Positive

1.749 2.999 3.499 3.999 5.249

1 Scaling to which teachers responded 6

CONCERNS OF SURVEY RESEARCH

Measurement, selection, sampling, frame, and nonresponse errors were controlled. Direct route inference was employed in a census of vocational horticulture teachers with one or more years of teaching experience during the 1984-85 school year. A complete frame was arrived at through input from state supervisory staff. Appropriate follow-up procedures during data collection and a comparison of late and early respondents controlled nonresponse error. The variables on which late respondents were compared to early rspondents were attitude of the teacher toward SOE, teacher perceptions of their SOE knowledge, and teacher perceptions of administrator support for SOE.

ANALYSIS OF DATA

Data collected were considered representative of a sample in time and analyzed accordingly with inferential statistics. The relationships between SOE quality and the teacher presage variables were determined through calculation of Pearson product moment correlation coefficients and Spearman rank order correlation coefficients. Scattergrams were examined to verify that the assumptions of linearity and homoscedasticity had not been violated. The relationships appeared to be linear and homoscedastic. Analyses of variance were employed to further analyze the data. Normality, random sampling, homogeneity of variance, and independence of observation assumptions were met. The alpha level were established a priori at the .05 level.

Indices of forecasting efficiency were calculated to gain an indication of the amount of variance of SOE quality that could be accounted for by the independent variables.

RESULTS

A summary of questionnaire returns is presented in Table 1. The number of questionnaires returned from 90 teachers was 85 (94.4 percent). Special needs horticulture teachers returned 7 (7.8 percent) questionnaires, while those teachers in regular horticulture programs returned 78 (86.7 percent) questionnaires. Population usable data were comprised of 84 (93.3 percent) questionnaires.

Table 1
Frequency and Percentage of Questionnaires Returned
by Type of Horticulture Program
(N=94)

	Questionnaires					
	Mailed		Returned*		Usable	
Type of Program	f	%	f	%	f	%
Special Needs	8	8.5	7	7.8	7	7.8
Regular	86	91.5	78	86.7	77	85.6
TOTAL	94	100.0	85	94.5	84	93.4

* Percentages are based on N=90; four teachers were reported to be no longer teaching.

The following results reflect characteristics of the teachers: 87 percent of the teachers reported having taught for five or more years; 58 percent of the teachers reported having been certified through alternatives other than a Bachelor of Science degree in Agricultural Education or Agricultural Education/Horticulture; 69 percent of the teachers reported having taken no vocational agriculture as high school students; and 76 percent of the teachers reported having not conducted an SOEP while in high school.

The mean SOE quality score was 50.56 with a standard deviation of 9.47. The range of scores was 34 with 34 the minimum and 67 the maximum. The means of SOE attitude, perceptions of teachers of their SOE knowledge, and support of administrators for SOE as perceived by teachers were 4.61, 4.39, and 3.71, respectively.

Measures of association between SOE quality and the seven teacher presage variables were either negligible or low. These relationships are summarized in Table 2. One-way analyses of variance were used to further analyze SOE quality by each of the presage variables. In all cases, there were no significant differences in SOE quality among any of the groupings for each of the seven presage variables at the .05 level.

Table 2
The Relationships Between SOE Quality and
Selected Teacher Presage Variables
(N = 77)

Relationship	Coefficient
SOE Quality/Attitude of the Teacher Toward SOE	$r=-.02$
SOE Quality/Perceptions of the Teachers of Their SOE Knowledge	$r=.06$
SOE Quality/Support of Administrators of SOE as Perceived by Teachers	$r=.09$
SOE Quality/Length of Teaching Experience	$r_{ranks}=-.09$
SOE Quality/Method of Certification of the Horticulture Teacher	$r_{ranks}=.08$
SOE Quality/Number of Years the Teacher Had Taken Vocational Agriculture in High School	$r_{ranks}=.18$
SOE Quality/Number of Years the Teacher Conducted an SOEP While in High School	$r_{ranks}=.09$

Indices of forecasting efficiency ranged from .0002 to .0182 and indicated that little or no variance would be explained in the dependent measure. A summarization of forecasting efficiency indices appears in Table 3 on the following page.

Table 3
Indices of Forecasting Efficiency for Teacher Presage Variables
(N=77)

Variable	Index of Forecasting Efficiency
Attitude of the Teacher Toward SOE	.0002
Perceptions of Teachers of Their SOE Knowledge	.0018
Support of Administrators for SOE as Perceived by Teachers	.0041
Length of Teaching Experience	.0041
Method of Certification of the Vocational Horticulture Teacher	.0032
Number of Years the Teacher Had Vocational Agriculture in High School	.0163
Number of Years the Teacher Conducted an SOEP as a High School Student	.0182

CONCLUSIONS

The following conclusions were drawn from the study:

1. The attitudes of vocational horticulture teachers toward SOE were positive as were the perceptions of the teachers of their SOE knowledge, but the teachers' perceptions of administrator support for SOE were only slightly positive.

2. Attitude of teacher toward SOE was a poor predictor of SOE quality.

3. Attitude of the teacher toward SOE does not account for a significant proportion of the variance in SOE quality.

4. The following six variables (a) were poor predictors of SOE quality and (b) did not explain the variance in SOE quality: teacher perceptions of their SOE knowledge, teacher perceptions of administrator support for SOE, length of teaching experience, method of certification of the horticulture teacher, number of years the horticulture teacher had taken vocational agriculture as a student in high school, and number of years in which the teacher conducted an SOEP while in high school.

RECOMMENDATIONS

The following recommendations were made based upon the findings and conclusions of the study:

1. Agricultural teacher educators must continue to foster the positive attitudes that teachers reported toward SOE and their SOE knowledge.

2. Agricultural teacher educators should provide horticulture teachers with the means for enhancing administrator support for SOE.

3. Additional presage variables warrant more sustained and systematic inquiry. The seven independent variables in the study represented only a few of the many teacher presage variables that might predict SOE quality. Teachers' training experiences, the courses taken while attending college, and individuals' experiences during student teaching are presage variables that may warrant further investigation.

4. The failure of this intuitively plausible explanation of SOE variability jeopardizes the theoretical models underlying the study. Further paradigms may be necessary to investigate the problem of SOE quality. Multiple paradigmatic inquiry is not unlike the development of a hybrid. The insufficiencies of a particular paradigm can be overcome through proper blending with other paradigms.

5. Future studies of SOE quality should be based upon theoretical models of teaching and learning, rather than upon intuitive collections of independent or exploratory variables.

6. The method of paired comparisons may be of further use in agricultural education research, particularly with problems where quantification is difficult.

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TEACHER PRESAGE VARIABLES AND QUALITY SUPERVISED OCCUPATIONAL EXPERIENCE: IS THERE A RELATIONSHIP?

A Critique

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I found this study to be both very interesting and very timely. The report was, however, replete with obfuscatory rhetoric, the effect of which was an unnecessarily stilted level of abstruseness. In other words, it could have been written in a much simpler form.

The introduction adequately served as a basis for the purpose and objectives. The objectives were clearly stated. The procedures were generally well explained, given the space limitations. The instruments were properly developed and tested for validity and reliability. The researchers should be given credit for their procedure in determining SOE program quality. Too often educators defer to an all too willing general public the responsibility of identifying the best from among our programs.

Several components of the study were either questionable or bear further explanation in the report. The study was a census of teachers within a specified supervisory district, but the data were analyzed with inferential statistics using the rationale that the data "were considered representative of a sample in time." No further explanation or justification is given. As appropriate a rationale to support the questionable use of sample statistics with census data might have been that the subjects were some type of purposive sample of a larger population.

The title immediately rouses interest to those who are interested in studying teacher effects on student performance. After seeing the term "teacher presage variables" I quicky turned to determine which specific variables were included. A study of Table 2 revealed that the presage variables in this study were a small portion of the examples cited by Mitzel (from Dunkin & Biddle, 1974, p. 38). The title promises more than the study delivers. Further, if one uses Mitzel's model as the example, it includes several levels and paths of variables. It seems conceptually difficult to perform any relational analyses between variables within levels in the model which are so far removed from each other. Thus determining the proportion of variance in SOE program quality that can be explained by a teacher attitude allows for too many opportunities for intervening variables.

The researchers conclude that the presage variables do not account for a significant proportion of the variance in SOE program quality. They further recommend that additional variables be studied in a sustained and systematic fashion.

The researchers should be given much credit for their attempt at this conceptual model. The failure to obtain statistical evidence of what the researchers term "intuitively plausible" relationships may not be attributable to their inexistence, but rather to the complexity of the conceptual model of the problem. As the researchers indicate, this is indeed an area in which research in agricultural education should be focused.

THE COLLEGE PREPARATORY CURRICULUM AND ACADEMIC PERFORMANCE IN COLLEGE: HOW DOES VOCATIONAL AGRICULTURE FIT INTO THE PICTURE?

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INTRODUCTION

One dimension of educational reform in the American high school is the advocacy of a core curriculum (Boyer, 1983; Goodlad, 1984; National Commission on Excellence in Education, 1983). The proposed core curriculum emphasizes college preparatory courses and usually omits vocational education courses, including vocational agriculture. Another dimension of educational reform is increasing college admission requirements including prescribed or recommended courses in high school that usually do not include vocational education courses (Goertz & Johnson, 1985).

There is agreement that certain academic competencies--reading, writing, speaking and listening, using mathematics, reasoning and studying--are essential for success in college. The argument follows, then, that these competencies are best acquired through enrollment in high school in English, mathematics, science, social science, foreign language, and the arts (The College Board, 1983). Research indicates that academic achievement in college is positively related to the extent to which students complete a college preparatory curriculum in high school, and that academic performance in high school (grade point average or rank in graduating class) and scores on achievement and aptitude tests, such as the ACT Academic Tests, predict academic achievement in higher education (Easton, 1970; Melton, 1961; Mitchell, 1985).

Of particular concern in agricultural education is the impact that the high priority given the college preparatory curriculum in high schools and the changing admission requirements for higher education are having on enrollment in vocational agriculture in high schools, on enrollment of vocational agriculture students in colleges of agriculture, and upon the academic performance in college of students who have and have not completed a college preparatory curriculum in high school. There is evidence of a negative relationship between the number of units of vocational agriculture completed in high school and the number of college preparatory courses completed; however, there is also evidence that enrollment in vocational agriculture does not necessarily prevent students from completing a college preparatory curriculum (Newman & Warmbrod, 1986).

PURPOSE AND OBJECTIVES

The purpose of the research reported in this paper was to investigate the relationship between academic performance of students in a college of agriculture and the extent to which they had completed a college preparatory curriculum in high school. Of particular interest was how enrollment in vocational agriculture in high school impacts upon the relationship between the completion of a college preparatory curriculum and academic performance in college. The following specific research questions were investigated:

1. What is the relationship between the number of units completed in high school in English, mathematics, science, social science, foreign language, and the arts and whether or not students graduate from college and, if they do graduate, their total cumulative grade point average and their grade point average in courses in agriculture?

2. What is the relationship between the number of units of vocational agriculture completed in high school and the extent to which students complete a college preparatory curriculum in high school; whether or not they graduate from college; and, if they do graduate, their total cumulative grade point average and their grade point average in courses in agriculture?

PROCEDURES AND ANALYSIS OF DATA

Data were analyzed for two populations of new first-quarter freshmen entering the College of Agriculture at The Ohio State University during the 1981 (n = 134) and 1982 (n = 169) autumn quarters who, at the time of graduation or leaving, were enrolled in the College. Data regarding students' rank in high school graduating class, scores on ACT Academic Tests, and high school courses completed were obtained from transcripts and other official documents in the Office of Admissions. Data regarding courses completed at the university and grades earned in these courses were obtained from university transcripts. Data regarding courses and academic performance at the university were collected January through April, 1987. Data were analyzed using multiple regression and discriminant analysis. The number of cases for some of the analyses is reduced since data for all variables were not available for all cases.

In the paper, college preparatory courses are defined as the courses required by The Ohio State University for "unconditional" admission. The Board of Trustees announced in April 1982 a new policy requiring entering freshmen, beginning autumn quarter 1984, to complete a college preparatory curriculum in high school to be admitted unconditionally. The prescribed college preparatory courses are four units of English, three units of mathematics, two units of social science, two units of science, two units of one foreign language, one unit of visual or performing arts, and one additional unit from any of the required subjects other than visual or performing arts. Enrollment in vocational agriculture can be used to meet the requirement for visual and performing arts. A total of 15 college preparatory units is required for "unconditional" admission. Students who do not meet this requirement are admitted as "conditional" and are required to remove the deficiencies by demonstrating competence by placement tests or by completing courses in the areas of deficiency that do not count toward graduation.

RESULTS

Graduation from College

Twenty-two percent of the freshman entering in 1981 had completed the recommended college preparatory curriculum; 11% of the students entering in 1982 had completed the courses required for unconditional admission (Table 1). A higher percentage of the students who met the requirements for unconditional admission had graduated or were still enrolled in good academic standing in 1987 then was the case for students who had not completed the recommended college preparatory curriculum. From 8 to 9 of each 10 students admitted unconditionally had graduated or were still enrolled; in contrast, approximately 7 of each 10 students admitted conditionally had graduated or were still enrolled.

Table 1

Admission Status and Graduation from College

Factor	1981	1982
Total Number of Cases	134	160
Admission Status		
Unconditional	22%	11%
Conditional	78%	89%
Percent Graduating		
When Unconditional Admission	90%	82%
When Conditional Admission	73%	69%

Discriminant analysis was used to investigate in more detail the extent to which the numbers of high school courses in English, mathematics, social science, science, foreign language, and visual/performing arts discriminate between students who had graduated (including students who are still enrolled in good academic standing) and students who had not graduated or were not enrolled. In addition to units of the college preparatory courses, class rank percentile and ACT composite score were included in the analysis as potential discriminating variables. Discriminant analysis revealed that ACT composite score, class rank percentile, and units of mathematics, science, and social science were the most powerful discriminating variables. The discriminant function coefficients for each of these variables are positive, indicating that higher values for these discriminating variables are characteristics of graduates rather than nongraduates. For the 1981 data, the discriminant function resulted in 68% of the cases correctly classified; for the 1982 data, 70% of the cases were correctly classified.

How does enrollment in vocational agriculture impact on the extent to which students complete a college preparatory curriculum and whether or not they graduate from college? The data support previous research indicating negative relationships between the number of units of vocational agriculture and the number of units of college preparatory courses completed. The magnitude of the negative relationships range from negligible (r = -.05) for English, low (r = -.18 to -.20) for mathematics and visual/performing arts to moderate (r = -.30 to -.58) for social science, science, and foreign language. The negative relationships between units of vocational agriculture and college preparatory courses are reflected in the fact that the percentage of students not enrolling in vocational agriculture in high school who were admitted unconditionally was from two to four times higher than the percentage of students who had studied vocational agriculture who were admitted unconditionally (Table 2). When graduation rates are compared, however, the percentage of former vocational agriculture students who had graduated or were still enrolled in good academic standing was higher than the percentage of students not studying vocational agriculture in high school who were in the graduate category.

Table 2

Relationship of Enrollment in Vocational Agriculture to Admission Status and Graduation from College

Factor	1981	1982
Total Number Cases	134	160
Percent Enrolled in Vocational Agriculture	50%	51%
Percent Unconditional Admission Status		
When Enrolled in Vocational Agriculture	8%	6%
When Not Enrolled in Vocational Agriculture	36%	15%
Percent Graduating		
When Enrolled in Vocational Agriculture	79%	77%
When Not Enrolled in Vocational Agriculture	75%	63%

The influence of vocational agriculture as a discriminating variable in predicting whether a student will be in the graduate or nongraduate category was examined by discriminant analysis. The addition of vocational agriculture to college preparatory courses, class rank percentile, and ACT score as discriminating variables indicated that units of vocational agriculture did not contribute to the efficacy of the discriminant function in classifying students as graduates or nongraduates. ACT scores, class rank percentile, and units of mathematics and science remain the most powerful discriminating variables.

Academic Performance in College

The relationship between whether or not a student completed a college preparatory curriculum in high school and academic performance in college was examined through multiple regression. Two measures of academic performance were examined--total cumulative grade point average and grade point average in agriculture courses. For each of these dependent variables, separate analyses were run for the 1981 and 1982 data. Regression analyses were calculated only for students who had graduated or were still enrolled in good academic standing in 1987. Detailed data are reported only for 1982; major deviations from the 1982 findings that are indicated by the 1981 data are noted. Independent variables were entered into the regression model in an hierarchical order with admission status entered first, followed by class rank percentile, and ACT composite score. Units of vocational agriculture completed in high school was the last variable entered to examine the relationship between enrollment in vocational agriculture and academic achievement in college.

Descriptive data pertaining to the regression analyses are reported in Table 3. An examination of the correlation matrix indicates that class rank percentile and ACT score are most highly correlated with academic achievement in college. These two independent variables are moderately intercorrelated (r = .42). There is a low degree of association between admission status and academic performance in college; for all practical purposes there is no relationship between units of vocational agriculture completed in high school and the two measures of academic performance in college.

Table 3

Summary Data: Regression of Academic Achievement in College on Selected Variables—1982 (n = 106)

Variable	Intercorrelations						$\overline{X}$	S.D.
	X_1	X_2	X_3	X_4	Y_1	Y_2		
X_1 Admission Status[a]	1.00	-.11	.13	-.16	.19	.16	.13	.34
X_2 Class Rank Percentile		1.00	.42	.12	.56	.56	77.27	19.01
X_3 ACT Composite Score			1.00	-.10	.54	.49	21.77	4.85
X_4 Units Vo-Ag				1.00	.03	.02	2.67	2.69
Y_1 Total College GPA					1.00	.94	2.68	.52
Y_2 Agriculture GPA						1.00	2.90	.53

[a] Conditional = 0; Unconditional = 1.

As indicated in Tables 4 and 5, admission status, class rank percentile, ACT score and units of vocational agriculture explain a significant proportion of the variance both in total cumulative grade point average ($R^2 = .465$) and grade point average in agriculture courses ($R^2 = .429$). Analyses for 1981 data yield comparable results. When the variables are entered into the model in the order indicated, class rank percentile is the most potent in explaining variance in academic performance in college. Admission status, class rank percentile, and ACT score each contribute significantly to the explanation of variance when all other independent variables are controlled.

Table 4

Regression of Final College Grade Point Average on Selected Variables: 1982 (n = 106)

Variable	R^2	R^2 Change	b	t	p
Admission Status[a]	.036	.036	.307	2.66	.009
Class Rank Percentile	.379	.343	.012	5.34	<.001
ACT Composite Score	.464	.085	.036	4.03	<.001
Units Vo-Ag	.465	.001	.007	.51	.61

Note. For Model: F = 21.97; p<.001.

[a] Conditional = 0; Unconditional = 1.

Table 5

Regression of Grade Point Average in Agriculture Courses on Selected Variables: 1982 (n = 106)

Variable	R^2	R^2 Change	b	t	p
Admission Status[a]	.027	.027	.279	2.31	.023
Class Rank Percentile	.368	.341	.013	5.46	<.001
ACT Composite Score	.428	.060	.030	3.26	.002
Units Vo-Ag	.429	.001	.004	.25	.804

Note. For Model: F = 18.95; p<.001.

[a] Conditional =0; Unconditional = 1.

The regression analyses provide information specific to the question of the relationship between completing a college preparatory curriculum (unconditional admission) versus not completing a college preparatory curriculum (conditional admission) and academic achievement. When class rank percentile, ACT score, and units of vocational agriculture are controlled, students who have completed the college preparatory curriculum would be expected to earn a grade point average approximately .3 higher than students who were admitted conditionally both for total college grade point average (b = .307) and grade point average in agriculture courses (b = .279). This difference is equivalent, for example, to the difference between a B and a B+ grade point average.

This finding was not corroborated by the analysis of the 1981 data. Admission status was not a significant variable in the regression model either for total college grade point average or grade point average in agriculture courses. Analysis of the 1981 data indicates that, when all other variables in the model are controlled, students who would have been admitted conditionally earned grade point averages that do not differ significantly from students who would have been admitted unconditionally.

The data reported in Tables 4 and 5 also provide direct information about the impact of enrollment in vocational agriculture in high school and academic achievement in college. Units of vocational agriculture is not a significant variable in explaining variance either in total cumulative grade point average or grade point average in agriculture courses. In addition to the proportion of variance in college achievement explained by admission status, class rank percentile, and ACT score, the incremental increase in proportion of variance explained by units of vocational agriculture is less than 1%. This finding is consistent for both the 1981 and 1982 data. When admission status, class rank percentile, and ACT score are controlled, students who study vocational agriculture in high school perform just as well academically in college as students who did not enroll in vocational agriculture.

CONCLUSIONS

For the relationship between completing or not completing a college preparatory curriculum in high school and academic performance in college, the evidence is inconclusive. For students who entered in 1981, those who completed a college preparatory curriculum (unconditional admission) did not have either a significantly higher total cumulative grade point average or grade point average in agriculture courses, when the influence of class rank percentile and ACT score on academic achievement are controlled, than students who had not completed a college preparatory curriculum (conditional admission). For students who entered in 1982, students who completed the college preparatory curriculum performed academically at a significantly higher level than students who had not completed the recommended college preparatory courses. Class rank percentile and ACT score are more potent in explaining, or predicting, college achievement than is type of curriculum completed.

Students who enroll in vocational agriculture in high school:

- are less likely to complete a college preparatory curriculum than students who do not enroll in vocational agriculture;

- are just as likely to graduate from college as students who do not enroll in vocational agriculture; and
- perform just as well academically in college as students who do not enroll in vocational agriculture.

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THE COLLEGE PREPARATORY CURRICULUM AND ACADEMIC PERFORMANCE IN COLLEGE: HOW DOES VOCATIONAL AGRICULTURE FIT INTO THE PICTURE?

A Critique

Alan A. Kahler, Iowa State University -- Discussant

This study was descriptive in nature designed to assess the performance of students in the College of Agriculture who had been admitted to Ohio State University "unconditionally" and those who had been admitted "conditionally." In addition, the study attempted to assess the impact of these two conditions for admission on students previous enrollment in vocational agriculture while attending high school.

The specific strenths of the paper and important findings were: (1) The paper was well written, concise and reported results directly related to the obejctives. (2) Appropriate statistices were used to analyze the data collected and the results were presented in a clear and understandable manner. (3) The research problem is significant and relevant to the agricultural education profession. (4) The study raises significant questions that should be researched to add meaning and understanding to this study. (5) The researchers observed that a greater number of students who had been admitted "unconditionally" had graduated from college than did those who had been admitted "conditionally." (6) ACT composite score, class rank percentile, and units of mathematics, science, and social science were the most powerful discriminating factors between those students who had graduated (or were still enrolled) and students who had not graduated (or were not enrolled). (7) Enrollment in vocational agriculture was not observed to discriminate between those students who had graduated and those who had not. (8) When admission status, class rank percentiale, and ACT scores were controlled, students who studied vocational agriculture in high school performed just as well academically in college as students who did not enroll in vocational agriculture.

As the reviewer read and studied the paper, several questions arose concerning the content of the paper. (1) How does vocational agriculture IMPACT upon the relationship between the completion of a college preparatory curriculum and academic performance in college? Webster defines "impact" as the power of an event, idea, etc. to produce changes." Based on the findings presented in this paper, one could conclude that vocational agriculture enrollment had no impact on completion of college and academic performance. An alternative conclusion could be that the study was attempting to assess how students who took vocational agriculture faired in completing college and how well they performed academically while in college. It would have clarified matters had the term "impact" been defined by the researchers. (2) Does a .42 correlation coefficient reflect "moderate" correlation? Several references indicate that a correlation coefficient at this level reflects "low" correlation between two variables. (3) were there other factors that may have affected the data that were not included in the study? The reviewer had the feeling that this may have been the case and would liked to have seen the researchers recognize this possibliity. (4) Are the findings of this study generalizable to other states and institutions? The reviewer would have felt more comfortable had the researchers confined their generalizations to Ohio and let the reader decide whether the findings were generalizable to their situations.

THE EFFECT OF PARTICIPATION IN SECONDARY VOCATIONAL AGRICULTURE ON SUCCESS IN POSTSECONDARY EDUCATION

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INTRODUCTION

What are the effects of participating in secondary vocational agriculture programs upon first, the individual and second, upon society? Lee (1978) indicated that vocational education should be evaluated on economic, social, and educational outcomes. These three evaluation criteria relate directly to vocational education's major objectives. The three basic objectives for vocational education, according to Evans and Herr (1978), are "(1) meeting society's needs for workers, (2) increasing the options available to each student, and (3) serving as a motivating force to enhance all types of learning" (p. 4).

The reason today for examining the success of vocational agriculture graduates, in part, appears to be an attitude by the general public toward the need for more academic subjects for students preparing to enter college. In light of this general perception (Gallup, 1979, 1982, 1985), this study examined the collegiate success of 1218 former vocational agriculture students and compared them with the collegiate success of an equal number of students who did not have any secondary vocational agriculture experience. Collegiate success was defined as successful completion of a two-year and/or four-year post-secondary program. The data base for this research was the National Longitudinal Study of the High School Class of 1972 (NLS72) (Riccoboni et al., 1981).

PURPOSE OF THE STUDY

The main study purpose was to determine if a relationship existed between enrollment in vocational agriculture (enrollment or non-enrollment in vocational agriculture treated as the major independent variable) and an individual's successful completion of postsecondary education (dependent variable). This included participation in two-year and/or four-year postsecondary programs.

The following factors were used in a modifying variable (alternative factors) context: (1) student's aspiration for postsecondary education; (2) sex; (3) race; (4) number of children in family; (5) number of semesters enrolled in vocational agriculture; (6) grade point average in high school; (7) college entrance examination score; (8) father's level of education; (9) mother's level of education; (10) father's occupation; (11) mother's occupation; (12) type of community; (13) size of graduating class; (14) number of semesters of math taken in high school; (15) number of semesters of science taken in high school; and (16) number of semesters of English taken in high school.

ANALYSIS OF THE DATA

For the purpose of this study, two subsamples were selected from the NLS72 data base. The first subsample consisted of 1,218 graduates identified as having taken at least one or more semesters of vocational agriculture. The second subsample was randomly selected which consisted of 1,218 graduates identified as not having a vocational agriculture background (zero semesters of vocational agriculture).

The first task in analyzing the data was to determine the basic distributional characteristics of each of the variables. After frequencies were calculated for all variables, statistically related decisions were made regarding assignment of missing values, recoding and collapsing of categories. The SAS subprogram CATMOD can only perform list-wise deletions: "Observations with missing values for any variable listed in the Model and Weight statements are omitted from the analysis" (SAS, 1985, p. 189). Because of this situation, it became necessary to insert mean scores in order to retain almost 50 percent of the sample. There were 416 graduates that did not answer the question regarding the amount of postsecondary education completed (the dependent variable) and all 416 dropped out of the analysis. There is documented justification for using the mean as a substitution.

> The important point to remember is that in repeated sampling, y will be approximately normally distributed with mean μ and standard error $\sigma/\sqrt{n}$. The approximation will be more precise as n, the sample size for each sample, increases. Thus the frequency histogram for y in our example would have been even more bell-shaped if n had been 10 rather than 5, or 15 rather than 10, and so on. (Ott, 1984)

A combination of statistical techniques was used to completely analyze the data. Techniques used were bivariate correlations, logistic regression, and multiple regression.

FINDINGS FOR HYPOTHESES

The hypotheses provided the basis for statistical data analysis. The General Linear Model (GLM) subprogram for Statistical Analysis System (SAS) was used to run the multiple regression analysis. This program builds upon the bivariate correlations in the regression analysis. This analysis was used to sort the variables (main effects) and first-order interactions before using the logistic regression analysis. By starting with multiple regression rather than with logistic regression a large amount of computer time was saved. Such a procedure has been used by statisticians to reduce to a more manageable scope the data analysis problem. The multiple regression procedure helped to locate the significant first-order interactions. The initial analysis (Table 1) included all main effects and those first-order interactions judged by the researcher as having a possible significant interaction.

A statistically conservative approach was taken by retaining all main effects until only significant first-order interactions remained in the model. At that point, all main effects not significant at the .05 alpha level or main effects which were not a component of a significant interaction were deleted from the model.

The most parsimonious model (Table 2) contained four main effects significant at the .001 alpha level: mother's education, father's education, highest educational aspirations, and semesters of math taken in high school. Two other main effects also were retained because they were parts of a significant interaction. The interaction between semesters of vocational agriculture and father's occupation (VoAg*Fath_Occ) was significant at the .05 level.

The reduced model developed through multiple regression actually contained two more significant interactions than shown in Table 2. It was not until data were analyzed using logistic regression that these two interactions dropped out of the reduced model. To have believed the multiple regression model alone would produce the model of best fit would have proven to have been an error in research judgment.

Table 1. Initial Multiple Regression Analysis of Model for Postsecondary Success of Former Vocational Agriculture and Non-Vocational Agriculture Students (n=2020).

Variable	b value	Sum of Squares	F value
Main Effects (Variables)			
Sex	.0077	.0176	.04
Vo Ag	.2238	2.754	5.55*
Collentc	.1036	.0947	.19
GPA1	.0867	.1894	.38
Race1	.1567	.6417	1.29
Race2	.1997	.7731	1.56
Moth_Occ	.0000	.0514	.10
Moth_Ed	.0748	.2861	.58
Fath_Occ	.0009	.1572	.32
Fath_Ed	.0686	.2852	.57
Postasp7	.5224	23.57	47.51***
Math	.0037	.0034	.01
Science	.0075	.2310	.47
English	.0088	.0134	.03
Commtype	.0068	.0369	.07
Numchild	.0198	.4677	.94
HSclass	.0041	.0279	.06
First-Order Interaction			
VoAg*GPA1	.0007	.0008	.00
VoAg*Collentc	.0345	.9907	2.00
VoAg*Race1	.0103	.0375	.08
VoAg*Race2	.0105	.0264	.05
VoAg*Fath_Occ	.0008	1.8048	3.63*
VoAg*Moth_Occ	.0000	.4690	.95
VoAg*Moth_Ed	.0124	.3821	.77
VoAg*Fath_Ed	.0074	.1442	.29
VoAg*Math	.0099	.9749	1.96
VoAg*English	.0163	2.199	4.43
VoAg*Numchild	.0065	.9941	2.00
VoAg*Postasp7	.0058	.3534	.71
GPA1*Postasp7	.0730	13.25	26.70***
Collentc*Postasp7	.0154	.2409	.49
Race1*Postasp7	.0362	.6418	1.29
Race2*Postasp7	.0792	2.411	4.86*
Postasp7*Math	.0097	1.522	3.07
Moth_Occ*Postasp7	.0000	.0012	.00
Moth_Ed*Postasp7	.0172	1.045	2.11
Fath_Ed*Postasp7	.0013	.0073	.01
Fath_Occ*Postasp7	.0001	.0625	.13
Postasp7*English	.0045	.2206	.44
Postasp7*Numchild	.0063	1.26	2.54
GPA1*Collentc	.0844	.9777	1.97
GPA1*Moth_Ed	.0091	.0471	.09

Table 1. Continued.

Variable	b value	Sum of Squares	F value
GPA1*Fath_Ed	.0028	.0053	.01
GPA1*Math	.0035	.0304	.06
GPA1*English	.0117	.2084	.42
Collentc*Moth_Ed	.0097	.0216	.04
Collentc*Fath_Ed	.0264	.1930	.39
Collentc*Math	.0041	.0168	.03
Collentc*English	.0186	.2488	.50
Moth_Ed*Numchild	.0071	.3230	.65
Fath_Ed*Numchild	.0087	.5324	1.07

Multiple $R^2 = .5838$
F Model = 54.15; $p<.001$
*$p<.05$ (two-tailed test)
**$p<.0001$ (two-tailed test)

Table 2. Multiple Regression Analysis of Reduced Model for Postsecondary Success of Former Vocational Agriculture and Non-Vocational Agriculture Students (n=2020).

Variables	Correlation	b-value	Beta	t-value
Main Effects				
VoAg	.19689	.0108	.0151	0.612
Moth_Ed	.37210	.1353	.1223	6.78**
Fath_Ed	.36671	.0910	.0891	4.75**
Fath_Occ	.18333	.0006	.0171	0.84
Postasp7	.70661	.3528	.6001	35.95**
Math	.33925	.0683	.1151	7.25**
Interactions				
VoAg*Fath_Occ		.0009	.0637	2.45*
(Constant)			.2567	4.55**

Multiple $R^2 = .5494$
Adjusted $R^2 =- .5478$
F Model = 350.389; df = 7, 2012; $p<.0001$
*$p<.05$ (two-tailed test)
**$p<.001$ (two tailed test)

Hypotheses Test Results

Three hypotheses were tested, and a brief synopsis of the results related to each hypothesis are presented in this section.

Hypothesis 1: *There are certain key variables which significantly influence postsecondary success*: Postsecondary educational success was measured by the amount of education completed at a two-year and/or four-year postsecondary institution. Table 3 details the amount of postsecondary educational completed. There was a significant relationship between postsecondary attainment and six variables in the study: (1) postsecondary educational aspirations, (2) semesters of vocational agriculture taken in high school, (3) father's occupation, (4) father's level of education, (5) mother's level of education, and (6) semesters of math taken in high school (see Table 2). The variable, semesters of vocational agriculture, was a significant component because of its interaction with father's occupation.

Table 3. Amount of Education Completed by Former Vocational Agriculture and Non-Vocational Agriculture Students (n = 2436).

Variable: Postsecondary	Cumulative Frequency	Cumulative Percent	Frequency	Percent
Non-respondents	416	----	----	----
High school only	695	34.4	695	34.4
<2 years postsecondary	685	34.9	1380	68.3
>2 years postsecondary	288	14.3	1668	82.6
4 years or more	352	17.4	2020	100.0

It was worthwhile to note that the main effects, semesters of science (science) and grade point average in high school (GPA1) which were among the most highly correlated (r=.29 and .35, respectively, as identified in the bivariate analysis not reported in this paper) with the dependent variable, were not found in this reduced model. Highest educational aspirations (Postasp7) was the single most important predictor of postsecondary success. This was indicated by a very high correlation with the dependent variable, amount of postsecondary education and a very high t-value.

Hypothesis 2: *There is a significant relationship between enrollment in secondary vocational agriculture and attending postsecondary education.* There was a significant positive relationship between enrollment in secondary vocational agriculture and post-secondary education. Data presented in Table 4 identifies which variables significantly improved the odds for postsecondary success. To determine the odds, it was first necessary to calculate the log odds and then the odds.

All odds greater than 1.00 indicated that variables improved the chances for post-secondary success. If the odds were equal to 1.00 the chances for improvement were even. The odds were interrupted in the following way: with a 1 unit increase in educational aspirations (Postasp7), the student's chances (odds) for going on to four or more years of college vs. high school only increased 6.42 times. All variables (main effects) except for father's occupation (Fath_Occ) improved the chances for attending some form of postsecondary education. All variables except father's occupation and semesters of vocational agriculture (Vo Ag) were statistically significant at the .001 level. The only variable in the model with odds below 1.00 was interaction of semesters of vocational agriculture and father's occupation (VoAg* Fath_Occ).

It was important to note how the odds decreased as the differential in educational levels narrowed (moving from top to bottom in Table 4). This indicated that variables were their most influential when using a high school education as the base educational level. The extremely powerful effect of educational aspirations (Postasp7) should not be overlooked. But, even the odds for educational aspirations were reduced by 67 percent when two years or more postsecondary education was compared with four or more years. A student always bettered the chances for participating in some form of postsecondary education through enrollment in vocational agriculture. The effect of vocational agriculture appears to be the most influential on those individuals attending less than two years of postsecondary education.

Hypothesis 3: *There is a significant relationship between enrollment in secondary vocational agriculture and the amount of postsecondary education completed.* There was a significant relationship between enrollment in vocational agriculture and the amount of postsecondary education completed. There was also a significant interaction between father's occupation and semesters of vocational agriculture taken in high school. Of the 2433 respondents, 1032 (42%) had fathers with occupation values (as rated by the Duncan Socioeconomic Index) rated 20 or below. In those cases where father's occupation value was rated 20 or below, the student's odds or chances for more postsecondary education increased with each year of enrollment in vocational agriculture.

CONCLUSIONS

The conclusions of this study were as follows:

1. The key variables that significantly influenced postsecondary success are listed in order from most influential to least influential: (a.) Postsecondary educational aspirations; (b.) Semesters of mathematics taken in high school; (c.) Mother's level of education; (d.) Father's level of education; (e.) Semesters of vocational agriculture taken in high school; (f.) Father's occupation.

The single most important element in postsecondary educational success was the individual's educational aspirations at the time of high school graduation. Regardless of grades, family background, high school curriculum or any other variable tested in this study, the strongest factor in success was the human spirit or the desire for participation in some form of postsecondary education.

2. Enrollment in vocational agriculture was advantageous to those with postsecondary aspirations.

Past studies that compared non-vocational agriculture and vocational agriculture students did not control for the differences in students. This study did control for many of those differences (by the use of logistic regression) and found that the student always bettered his or her chances (odds) for postsecondary success by enrollment in vocational agriculture.

3. Enrollment in vocational agriculture was significantly effective with students having a lower socioeconomic standing.

This conclusion was reached because of the statistically significant interaction between the variables: father's occupation and semesters of vocational agriculture taken in high school. It was important to note the Duncan Socioeconomic Index (Reiss, 1961) rated farmers 14 on a scale of 1-100. This was all farmers, both owners and tenants. The index appeared to be based purely on the amount of formal education required for the occupation.

Table 4. Logistic Regression Analysis of Reduced Model for Postsecondary Success of Former Vocational Agriculture and Non-Vocational Agriculture Students (n=2020).

Variable	Log Odds	Odds	Standard Error	Chi Square
4 or more years of post-secondary education vs. high school only				
Constant	12.17	.000005	.6021	405.85**
VoAg.	.1572	1.170	.1198	1.72
Moth_Ed	.7492	2.12	.1182	40.15**
Fath_Ed	.4986	1.65	.1121	19.78**
Fath_Occ	.0044	1.00	.0045	.96
Postasp7	1.86	6.42	.0916	416.09**
Math	.3702	1.45	.0559	43.83**
VoAg*Fath_Occ	.0078	.9922	.0028	7.69*
4 or more years of post-secondary education vs. less than 2 years				
Constant	9.83	.000005	.5713	296.50**
VoAg	.2208	1.25	.135	3.78
Moth_Ed	.4390	1.56	.1006	19.41**
Fath_Ed	.4390	1.55	.0960	20.89**
Fath_Occ	.0044	1.00	.0045	0.96
Postasp7	1.34	3.82	.0832	259.35**
Math	.2593	1.30	.0489	28.07**
VoAg*Fath_Occ	.0076	.9924	.0026	8.40*
4 or more years of post-secondary education vs. more than 2 years				
Constant	5.29	.005	.5482	93.13**
VoAg	.0743	1.08	.1138	.43
Moth_Ed	.2521	1.29	.0949	7.05*
Fath_Ed	.2185	1.24	.0904	5.84
Fath_Occ	.0016	1.00	.0039	.18
Postasp7	.6846	1.98	.0798	73.47**
Math	.1790	1.20	.0470	14.48**
VoAg*Fath_Occ	.0029	.997	.0026	1.22

*p <.01
**p <.001

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THE EFFECT OF PARTICIPATION IN SECONDARY VOCATIONAL AGRICULTURE ON SUCCESS IN POSTSECONDARY EDUCATION

A Critique

Stacy A. Gartin, West Virginia University — Discussant

The purpose of this study, as the title implies, was to determine the effect of participation in secondary vocational agriculture on success in postsecondary education. The author is to be commended for investigating a topic of obvious interest to him and the profession.

Strengths

1. A scholarly introduction provided the necessary theoretical framework for the study.
2. The purpose of the study has been clearly stated.
3. Statistical procedures appropriate for the study have been used.
4. The results are clearly presented in both tabular and narrative forms.

Weaknesses

Few weaknesses were found in this report. Some that I would raise for discussion purposes are:

1. How and when were the data collected?
2. Why was the class of 1972 utilized?
3. What was the basis for selecting the modifying variable (alternative factors)?

The researchers are to be commended for conducting are excellent study that has potential of being useful to the agricultural education profession.

THE EVOLUTION OF THE PROBLEM-SOLVING APPROACH IN AGRICULTURAL EDUCATION: A HISTORICAL ANALYSIS

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INTRODUCTION

In the not so distant past, educators perceived the basics as the three R's: Reading, (w)Riting, and (a)Rithmetic. Today, a review of the literature on the basics of education requires the addition of a post-script or P.S. In this case, the P.S. stands for problem-solving.

Evidence on the importance of problem-solving as a basic skill comes from the workplace, educational study commissions, parents, and teachers. Employers herald the ability to solve problems as critical to an organization's effectiveness (Miller and Feggestad, 1987). Educational reform commissions include problem-solving as an essential element in the preparation of all students (Education Commission of the States, 1983). The National Commission on Secondary Vocational Education (1985) recommends that "Secondary vocational education courses should provide instruction and practice in the basic skills of reading, writing, arithmetic, speaking, listening and problem-solving" (p. 25). A survey by the National Council of Teachers of Mathematics found that both teachers and parents agree that problem-solving should receive the highest priority as the major focus of the curricula in the decades of the 80's (Johnson, 1987).

The recent attention given to problem-solving might lead one to believe that problem-solving is a newly discovered basic skill. However, problem-solving as an approach to teaching vocational education, particularly agricultural education, has been used for decades. As a result, high school students taking vocational courses have also developed problem-solving skills.

Vocational education textbooks advocate the use of the problem-solving approach in the classroom. All contemporary textbooks on teaching methods in agricultural education include a section on problem-solving (Phipps, 1980; Binkley and Tulloch, 1981; Crunkilton and Krebs, 1982; Newcomb, McCracken and Warmbrod, 1986). While most textbooks on teaching methodology adequately cover the steps to the problem-solving approach, few devote any space to discussing the inception and evolution of this widely accepted practice. As a profession, we should be as adequately informed about the development of the problem-solving approach as we are about the procedures for implementing it in the classroom. By examining the history and evolution of problem-solving we can better understand its conceptual basis and know why it works so well in vocational education.

PURPOSE AND OBJECTIVES

The purpose of this research was to discover the evolution of the problem-solving approach in agricultural education from its inception. Specific objectives were:

1. To identify individuals instrumental in developing problem-solving as an approach for teaching vocational agriculture.
2. To identify events in the history of the development of agricultural education that influenced the adoption of problem-solving.
3. To identify changes in the application of the problem-solving approach in teaching vocational agriculture.

PROCEDURES

Research procedures appropriate to historical research were used in conducting the study. First, the problem area was delineated and then historical data was collected. In this study the researchers collected historical materials dating to the 1900's. Computerized literature searches of educational databases were conducted along with a hand search of older publications which were not included in the databases. Specific publications examined were: the Agricultural Education Magazine, textbooks in agricultural education, early textbooks in education, the Journal of the AATEA, and U.S. government documents.

Thirty-five different source materials were identified which were deemed important in light of the objectives and were used in this study. With careful attention to both internal and external criticism, the information collected was organized and conclusions and generalizations formulated.

RESULTS

Early educators (prior to late 1800's) emphasized the method of recitation. Recitation is defined as assigning portions of the textbook for study and requiring students to recite the assignment (Thayer, 1928). Charles McMurry and Frank M. McMurry were authors of a book on recitation called The Method of Recitation (1903). Herbart's Formal Steps of Instruction included a large section on recitation. Early educators such as Ziller, Rein, DeGarmo, and McMurry advocated the Herbartian approach to teaching (DeGarmo, 1896; McMurry, 1903; Bagley, 1908).

Books written specifically on teaching agriculture emerged during the early 1900's. It is believed that Gerald Bricker's book The Teaching of Agriculture in the High School (1916) which was first copyrighted in 1911, was the first book written on the teaching of agriculture. Bricker (1916) advocated that "a properly organized course in secondary agriculture must be primarily and fundamentally a series of laboratory and field exercises made up of carefully selected materials, pedagogically and systematically arranged, around which recitations, lectures, and reading will center as supplementary work" (p. 127).

Another early book, Materials and Methods in High School Agriculture (Hummel and Hummel, 1913), identifies three ways for pupils to acquire knowledge: "by authority, by observation, and by experimentation" (p. 69). The Teaching of Agriculture (Nolan, 1918) gives further insight to the teaching approaches advocated for agricultural education. Nolan discusses the following approaches: use of textbooks, reports and class recitations, lecture, use of illustrative material, laboratory methods, and home projects. In 1918, the first year of vocational education under the Smith-Hughes Act, vocational education teachers assigned lessons in textbooks and used recitation and the lecture approach to teaching. Stimson (1942) also cites the use of the project method of instruction.

New approaches to teaching began to emerge when educators became dissatisfied with approaches that only provided knowledge and book information without interrelating classroom work with other school activities and with issues of American life (Thayer, 1928). According to Thayer, "Not only do these new concerns of the school call for new methods of teaching and a transformed school organization; they call as well for an education which abandons the compartmental procedure of the past in which culture and vocation avoid more than a speaking acquaintance" (p. 159).

An early American educational leader in agreement with the philosophy espoused by Thayer was John Dewey. Dewey became a primary force in the revolution of the educational system. His philosophy on pedagogical matters greatly influenced the changes which occurred in the early 1900´s.

Dewey´s Contributions

Dewey began to be recognized as an outstanding educator with his work at the School of Education at the University of Chicago (Getman, 1932). In his book, School and Society (1900), Dewey called for a transformation of the school system to coincide with the radical social changes that had occurred. He emphasized student centered education that "introduces and trains each child of society into membership within such a little community, saturating him with the spirit of service, and providing him with the instruments of effective selfdirection, we shall have the deepest and best guarantee of a larger society which is worthy, lovely, and harmonious" (p. 44). Learning experiences of children at Dewey´s elementary school were illustrated in School and Society. He emphasized that children should learn from their own experiences and by working out their own problems.

Dewey´s book, How We Think (1910), further emphasized his attitudes towards a new and better way of educating students. Dewey concluded that teaching students to think was extremely important in educating them for membership in society. Thinking meant "[bridging] a gap in experience, to bind together facts or deeds otherwise isolated" (Dewey, 1910, p. 79). Students need to learn to think systematically and not haphazardly. To Dewey, systematic thinking involved both inductive and deductive thought. Thought was to include deliberate and intentional activities in a systematic fashion. Thus, objects reflected upon were to have more value to the individual.

Although Dewey did not use the term "problem-solving", the steps of his "reflective thinking" coincide with steps of our modern day problem-solving technique. The five steps of reflective thinking, as outlined by Dewey (1910), were as follows:

1. felt difficulty
2. its location and definition
3. suggestion of possible solution
4. development by reasoning of the bearings of the suggestion

5. further observation and experiment leading to its acceptance or rejection (p.72).

Dewey stated that the steps 1 and 2 often blend together and emphasize a "perplexity or problem". A felt difficulty or need is expressed by the student. Suggestions for possible solutions are made from inferences concluded from known knowledge. "Hypotheses" are formed but a solution is not chosen pending further evidence. Implications are reasoned from past experience and new information. Verification is made once the hypotheses are tested and then conclusions or solutions are derived. Both inductive and deductive thought are used in the five steps of reflective thinking with inductive thought moving towards discovery of principle and deductive thought moving towards testing the principle.

In Democracy and Education (1916), Dewey outlined five stages of the thinking method. This method uses problems to teach subject matter; problems are based on the experience of the students. Experiences furnish resources for dealing with the problem at hand. "New problems" should be large enough to challenge thought, but small enough so past experience or familiar information will spring suggestions and thinking will occur. Collection of data from past experience and new resources arouses suggestions for solutions to the problem. Suggestions must then be applied for a solution to be derived.

Dewey believed that the best type of teaching motivates students to think and involves their "out-of-school experiences" in the lesson. According to Dewey, the thinking method accomplished that objective. The problem-solving approach to teaching used today accomplishes the same purpose. The two methods, reflective thinking and thinking method, appear to be the predecessors of the problem-solving technique used in vocational education today. Therefore, Dewey must be given credit for conception of the idea of problem-solving. However, "he was much stronger at formulating and discussing pedagogical theories than at making practical applications" (Burton, 1935, p. 248). The practical applications of the problem-solving approach came later through other individuals. Early agricultural teachers who were trained by academic educators were primarily responsible for the application of the problem-solving approach in agriculture. Since Dewey was at the peak of his career when agricultural education emerged as a secondary school subject, many of the early teachers were influenced by Dewey´s teachings and readings.

Charters´ Contributions

One of Dewey´s students at the University of Chicago was Werrett Wallace Charters. Charters is quoted as saying: "I suppose I should be classed as a disciple of Dewey because I studied under him during his last three years at the University of Chicago. From these contacts I gained one central idea which has defined my interest and effort in the field of education" (Stewart, 1933, p. 115).

After Charters graduated from the University of Chicago, he became very interested in methods of teaching (Stewart, 1933). Charters believed that the normal learning process involved problems and that learning was obtained when individuals attempted to find solutions to their own problems. Using this principle with students resulted in the "economy of mental effort, increase of interest, and more permanent results" (Lane, 1919, p.40). Teachers should search the experiences of students to find relevant problems of value (Charters, 1912). Stimson (1942), in a discussion of the problem method, referred to "W. W. Charters´ problem-method concept" (p. 601). It is believed that Dewey implanted the ideas for which Charters titled the problem-method.

In Charters´ book, Methods of Teaching (1912), he emphasized that problems used in teaching should be real problems of importance to the students and serve as a motive for learning new subject material. The origin of such problems may be from habits, a conflict between ideas, concrete activities, curiosity and the discipline of natural consequences. Charters used three steps for problem-solving, instead of five steps as outlined in Dewey´s Reflective Thinking process. His steps included:

1. Recognition of the problem or defining the problem.
2. Attempt at solutions or forming hypotheses.
3. Testing the solutions or verification of proposed solutions.

Charters problem-solving method involved both inductive and deductive thinking similar to Dewey´s reflective thinking method. According to Charters, inductive thinking processes manufacture the rules that deductive thinking processes apply to particular cases.

In his book Teaching the Common Branches (1913), Charters devoted a chapter to the subject of agricultural education. A section of this chapter discussed teaching methods to be used in teaching agriculture. The first method discussed is the problem method. Here, Charters stated that the study of a "good practical problem" should include the collection of facts, intelligent guessing, and the study of textbooks. The best way of teaching new information would be to develop a problem first and in the process of solving it, teach new facts.

Intelligent guessing could be used with problem-solving to encourage students to think on their own. Students should use books and bulletins to find information for solutions to the current assigned problems. Charters (1913) believed that facts "should be taught little by little, as the solution to little problems" (p. 317).

Lancelot´s Contributions

William Lancelot was an early promoter of problem-solving in agricultural education. He expanded the project method "to include the teaching of decision-making skills and abilities using real problems..." (Kahler, 1977, p. 215). After receiving the Bachelor of Science degree in Agricultural Education in 1919, Lancelot pursued graduate study at several universities including Columbia University. Dewey was teaching at Columbia during this time and although it is not documented that Lancelot was an actual student of Dewey, he may have been influenced by Dewey´s philosophical views.

In Lancelot´s books, Handbook of Teaching Skills (1929) and Permanent Learning (1944), the problem-solving method was advocated as the method for permanent learning to occur. Lancelot detailed how to incorporate problems into the subject matter, the different types of problems that can be used, how problems arouse a feeling of need; and when problem-solving is appropriate, in addition to other aspects of using the method.

Lancelot believed students could be led to think by giving them something to think about. Thinking could be induced by giving students problems to solve. He defined a problem as "merely a thought question of relatively broad scope" (Lancelot, 1929, p. 35) which requires many minutes or even hours to solve. The technique should be used in the teaching of all subjects, but it may not be possible in all circumstances. Lancelot originally divided the problem-solving thinking process into 10 steps, but later modified the method into four steps.

In both books, Lancelot discussed the finding, judging, and testing of problems to be used in teaching. Problems chosen should have the following qualities: represent real life situations, interest the students, be clearly defined, be of proper scope and difficulty, and call for superior thinking (Lancelot, 1929). Problems should induce inductive reasoning or judgement and creative thinking.

Once problems are chosen, they are tested by a scoring process. Every new problem should be tested before it is presented to the students. Testing eliminates defects which may lead to ineffective teaching. Lancelot recommended using a scale ranging from 0 to 5. With 5 representing excellence, 0 for total absence of the quality scored (Lancelot, 1944). Those problems falling below acceptable standards were to be revised or completely thrown out. "The quality of teaching is largely dependent upon the quality of the problems used" (Lancelot, 1944, p. 170).

Lancelot developed the techniques for using problems to teach subject matter. He developed the rules or guidelines for teachers to implement when using the method. Lancelot had many followers because of his writings and teachings on the problem-solving approach to teaching. One of these followers was agricultural educator W. F. Stewart of The Ohio State University.

Stewart's Contributions

Dr. Stewart served as Professor and Chairman of the Department of Agricultural Education at The Ohio State University from 1917-1948. In his teaching, Stewart emphasized the importance of methods, particularly the problem method of teaching. He believed firmly that if teaching is interesting, useful, and challenges thinking, then it needs to be related to the pupil's home and farm situation. For him, subject matter had only one use and that was to solve relevant problems (Bender & Wolf, 1972).

Stewart wrote a book concerning teaching, Methods of Good Teaching published in 1950. He dedicated the book "To My Master Teacher, William Henry Lancelot." However, Stewart did his graduate studies at the University of Wisconsin and at Columbia University while Lancelot was a professor at Iowa State College. William H. Wolf, retired professor of Agricultural Education at The Ohio State University, provided the missing link of information need to make the connection between Lancelot and Stewart. On November 25, 1986, Dr. Wolf was interviewed by telephone. He remembered that Stewart took a course one summer at Iowa State College. Lancelot taught the course which was centered around the problem-solving method. Stewart was impressed with

Lancelot´s teachings and the method he advocated. Thus, Stewart´s writings on problem-solving were greatly influenced by his teacher, Lancelot.

Stewart´s book is written in the `you and I´ style and therefore does not tell the students what methods to use but induces them to derive their own methods. He uses the problem approach within the book to stress methods of good thinking. At the conclusion of a section of information, a class *problem* is presented for discussion.Stewart´s procedure for the method consisted of five steps similar to Lancelot´s procedure:

1. State the problem as clearly and definitely as its life situation permits...
2. Recall or find out the factors having a bearing upon the problem.
3. Recall or find out the facts related to each factor.
4. Evaluate the factors recognizing their relative importance in the specific situation under consideration.
5. With consideration given to the evaluation, make the decision (Stewart, 1950, p. 133).

Stewart discusses the concept of a "good problem." Like Lancelot, he uses a scale to judge problems for soundness.

Problem-Solving on the Forefront

The problem-solving approach used at the present time in agricultural education coincides with the views of our early leaders. Phipps (1980), Crunkilton and Krebs (1982), and Newcomb, McCracken and Warmbrod (1986) all discuss problem-solving as an approach to teaching. In *Methods of Teaching Agriculture* (Newcomb, et al., 1986) the authors compare the principles of learning to the stages of problem-solving. Since the learning process is a problem-solving process, vocational agriculture teachers need to use this approach to enhance the learning of students.

CONCLUSIONS

The problem-solving approach to teaching was not the sole work of one individual, but a synthesis of ideas and beliefs of the individuals mentioned. Dewey planted the seed based on his philosophical ideas of how children should be educated. Charters did the early cultivation when the idea was just a seedling and identified the method as problem-solving. Lancelot cultivated and nurtured the seedling into maturity. He gave the method its shape and provided the guidelines for teachers to follow when implementing the method. Stewart harvested the fruit by advocating it as the method of teaching students "to make right decisions or to solve their own problems. Finally, present day vocational educators espouse the problem-solving approach because of its correlation with the learning process.

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THE EVOLUTION OF THE PROBLEM-SOLVING APPROACH IN AGRICULTURAL EDUCATION: A HISTORICAL ANALYSIS

A Critique

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"Historical perspectives are valuable to agricultural educators as they cope with current issues and concerns and chart the course of the vocational agriculture program of the future" (Mannebach, 1986). Thank you to the authors for providing such a perspective for a topic in which our profession has invested heavily.

Problem solving has become a "buzzword" of contemporary education. But what is problem solving; an ability of students or an approach taken by teachers? Definitions and later reference to the problem solving ability documented in the introduction and the problem solving approach actually investigated may have enhanced the research demeanor of the study.

A definition and purpose of historical research forwarded by Gay (1981) states that historical research "is the systematic collection and objective evaluation of data related to past occurences in order to test hypotheses concerning causes, effects, or trends of these events that may help to explain present events and anticipate future events." The researchers satisfied this definition and purpose through their systematic collection and evaluation of data, leading to explanations of present events. I am uncertain, however, if any true hypotheses or research questions were developed and tested. Are research questions and/or hypotheses a requirement for historical research? Without them do we have only a detailed review of the literature? Would it not be interesting to learn how the evolutionary changes in the problem solving approach effected the problem solving abilities of students? A different question, but one which could be addressed through true historical research.

The researchers have demonstrated sound methods throughout data collection, evaluation, and interpretation. I commend them for an effort well done and challenge them to continue historical studies guided by literature derived, testable hypotheses.

THE ROLE OF EXTENSION IN RURAL AMERICA AS PERCEIVED BY UNITED STATES SENATORS

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INTRODUCTION

Rapidly changing social, economic, and technological climates are forcing the Cooperative Extension Service to constantly examine and evaluate the focus of its current programming efforts.

THE PROBLEM

How the CES responds to meet the changing needs of its rural clientele will likely determine its future effectiveness as the primary informal educator of rural America. Quality of life for millions of Americans living in rural areas of the country may well be determined by the educational programs available to them through the CES.

Legislators at all levels of government have an impact on Extension's ability to provide quality educational programs and achieve its goals. The fact that legislators provide or withhold fiscal support for the CES is reason enough for the CES administrators to be concerned with the understanding legislators have of existing CES programs. CES professionals need to work closely with legislators in order to sustain the cooperative support that the CES enjoys. Adequate understanding of CES program thrusts on the part of legislators will likely bring about future fiscal support for the CES programming efforts.

OBJECTIVE OF THE STUDY

The purpose of this study was to determine how United States Senators perceive the role of the Cooperative Extension Service in rural America. Specifically, the study had the following objectives:

1. To identify CES programs that U.S. Senators perceive as being most important to the rural population.
2. To identify the differing needs of rural residents (as perceived by U.S. Senators) according to the four CES geographic regions of the U.S.

3. To determine if tenure in the United States Senate or membership on the United States Senate Committee on Agriculture affects U.S. Senators' perceptions of the role of the CES in rural America.

4. To determine if participation in CES programs (as a farmer, 4-H club member, or homemaker)affects U.S. Senators' perceptions of the role of the CES in rural America.

5. To determine if U.S. Senators perceive the CES as providing a necessary service to rural America.

6. To determine if U.S. Senators perceive the CES as reaching a large segment of the rural population in America.

PROCEDURES

Data for this study were obtained through the use of descriptive survey research. This method of research was deemed appropriate because of its ability to describe situations as they exist.

Due to time constraints on the part of the investigator and the study population, it was not feasible to administer the survey instrument by personal interview. The survey instrument was administered by mail.

DEVELOPMENT OF THE INSTRUMENT

Following a review of pertinent literature, forty-two specific functions of the CES in rural America were identified and organized to form a questionnaire. Mission statements and program objectives of the CES in several states, as well as those of the United States Department of Agriculture-Extension Service were utilized during the questionnaire development process. The questionnaire was reviewed for content validity by Extension agents, Extension specialists, Extension administrators, and agricultural education teacher educators at West Virginia University.

The CES functions were categorized under the headings of agriculture, community and natural resource development, home economics and human resource development, and 4-H and youth development. Several general information and opinion questions were developed and incorporated into the questionnaire.

A lykert scale of one through five was utilized, a value of five being used to describe a function that was very important and a value of one assigned to a function that was less important.

POPULATION OF THE STUDY

The target population for this study was the entire United States Senate membership serving during the ninety-ninth session of the United States Congress. The population consisted of two senators from each of the fifty states, for a total population of one hundred United States Senators.

Senators were chosen as the target population because of their representation of entire states, as opposed to congressmen and congresswomen who represent limited and specific portions of each state. The investigators believed that U.S. Senators were the most appropriate legislative position to comment on the role of the CES in rural America.

DATA COLLECTION PROCEDURE

The questionnaire was mailed to all U.S. Senators on May 2, 1985. A brief mailgram from Senate Minority Leader Robert C. Byrd (Democrat, West Virginia) encouraging participation in the research project also accompanied the questionnaire.

By June 1, 1985 thirteen responses were received. On June 3, 1985, a follow-up letter was sent to those senators who had failed to respond to the original request for participation. The follow-up letter yielded just nine additional responses.

On July 1, 1985, a duplicate copy of the questionnaire and a revised introductory letter were hand-delivered to non-responding senators' agricultural aides or secretaries at senate offices in Washington, D.C. Hand delivery was the most successful method for requesting participation, yeilding thirty-one additional responses.

By August 5, 1985, fifty-three responses had been received, of which six were returned with the questionnaire uncompleted by senators who refused to participate in the study. Overall, forty seven percent of those who were asked to participate in the study returned completed instruments for use in the study.

ANALYSIS OF DATA

Descriptive statistics were used to analyze data collected. Measures of central tendency were calculated for each of the CES functions contained in the questionnaire. Group means were also determined for party affiliation, geographic region, tenure in the U.S. Senate, membership on the U.S. Senate Committee on Agriculture, and participation in CES programs.

Analysis of variance was utilized to measure overall significance of differences existing in expressed importance of CES funcitons among respondents by party affiliation, geographic region, tenure in the U.S. Senate, membership on the U.S. Senate Committee on Agriculture, and participation in CES Programs.

RESULTS

IMPORTANCE OF CES FUNCTIONS

Overall, respondents rated importance of agricultural functions of the CES higher than other categories of functions. 4-H and youth development functions were also rated highly important, and were perceived as being more important that home economics and human resource development functions and community and natural resource development functions.

IMPORTANCE OF AGRICULTURAL FUNCTIONS

1. Respondents placed a high priority on the function of providing knowledge in agricultural production and management for full-time family farmers. Interpreting and disseminating research findings of the Agriculture and Forestry Experiment Station, and conducting applied research to demonstrate findings of the Experiment Station were also viewed as important agricultural functions of the CES in rural America. Respondents also thought important the function of counseling farm families faced with financial crisis.

2. While a majority of respondents indicated participating in CES programs, there were no significant differences between these groups with respect to agricultural functions.

3. Respondents from the southern and north central regions placed a greater importance on the function of interpreting and disseminating the finding of the Experiment Station. Respondents from the western region of the country rated the importance of developing agricultural product marketing strategies significantly lower than did respondents from other regions. Respondents from the western region also rated the functions of assisting with the development of farm cooperatives and assisting with the development of farm organizations significantly lower than did respondents from other regions.

4. Respondents with more than twenty years of tenure in the U.S. Senate rated the function of developing agricultural product marketing strategies significantly lower than did respondents with less experience.

5. Respondents who have served on the U.S. Senate Committee on Agriculture rated agricultural functions slightly higher than did their colleagues who have not served on the Agriculture Committee. Respondents who have not served on the Agriculture Committee placed a significantly lower importance on the function of conducting applied research to demonstrate findings of the Experiment Station.

6. No significant differences were observed when the perceived importance of agricultural functions were analyzed with respect to political party alliance. There was a high degree of agreement among respondents from both parties with respect to the importance of agricultural CES functions in rural America.

IMPORTANCE OF COMMUNITY AND NATURAL RESOURCE DEVELOPMENT FUNCTIONS

1. Respondents rated the function of providing educational programs on conservation of soil, water, and forest resources as the most important community and natural resource development function. The function of providing educational programs aimed at reducing home and farm energy needs was also seen as quite important in rural America, as were several functions that foster the development and expansion of business and industry in rural America.

2. There were no significant differences detected among respondents who have and have not participated in CES programs when community and natural resource development functions were analyzed.

3. Respondents from the western region rated the importance of all community and natural resource development functions lower than did respondents from other regions. Senators from the western region rated the function of providing information and assistance for the development and expansion of industry significantly lower than did respondents from other regions, and also gave significantly lower importance ratings to the functions of conducting educational programs aimed at reducing rural crime and conducting educational programs on conservation of soil, water, and forest resources.

4. While respondents with more than twenty years of tenure in the U.S. Senate rated all community and natural resource development functions lower than did respondents with less experience, no significant differences were observed with respect to tenure.

5. There were no significant differences detected among respondents who have served on the U.S. Senate Committee on Agriculture when community and natural resource development functions were analyzed.

6. Several significant differences among democrats and republicans were detected with respect to community and natural resource development functions. Republicans gave lower importance ratings to the functions of providing information and assistance for the development and expansion of business and industry and assisting local governments with determining community needs.

IMPORTANCE OF HOME ECONOMICS AND HUMAN RESOURCE DEVELOPMENT FUNCTIONS

1. Overall, respondents rated the importance of home economics and human resource development functions lower than other categories of CES functions. Respondents indicated that providing leadership development training and food and nutrition education were the most important home economics and human resource development functions in rural America, and indicated that cultural education and consumer and product safety programs were the least important.

2. There were no significant differences observed among respondents who have and have not participated in CES programs with respect to home economics and human resource development functions.

3. Respondents from the western region gave significantly lower importance ratings to the functions of providing leadership development training, providing cultural education programs, and conducting health educational programs for all community members.

4. There were no significant differences detected among respondents with different levels of tenure in the U.S. Senate when home economics and human resource development functions were analyzed. Respondents with more than twenty years of tenure in the senate did, however, tend to rate home economics and human resource development functions lower than did their collegaues with less tenure.

PERCEIVED PRIORITY OF CES AUDIENCES

1. A majority of respondents indicated that farm and rural audiences should be the focus of CES programming efforts.

2. An extremely high percentage of respondents from the southern and north central regions indicated that farm and rural residents should be the beneficiaries of CES programs.

EXTENT TO WHICH THE CES REACHES THE RURAL POPULATION OF AMERICA

1. An overwhelming majority of respondents indicated that the CES reaches a large segment of the rural population in their respective states.

2. Respondents in the southern and north central regions tended to view the CES as reaching a larger segment of the rural population than did respondents from other regions of the country.

EXTENT TO WHICH THE CES PROVIDES A NECESSARY SERVICE TO RURAL AMERICA

An extremely large percentage of respondents affirmed the need for the CES in rural America, and indicated that the CES did indeed provide a necessary service to the rural population of America.

CONCLUSIONS

From analysis of data received from 47 United States Senators in 38 states, the following conclusions were drawn:

1. United States Senators feel that the CES provides a necessary service to other rural population in America.

2. United States Senators feel that the CES reaches a large segment of the rural population in America.

3. United States Senators feel that the most important subject matter of the CES in rural America is the traditional areas of agriculture and 4-H youth development.

4. United States Senators do not think highly of CES programs that can or may be duplicated by other groups, agencies or professionals.

5. United States Senators feel that the most important audience of the CES is full-time family farmers.

6. United States Senators think highly of CES functions that positively impact on the economics welfare of families, communities, and states.

7. United States Senators perceive a great need for educational programs on the conservation of natural resources and energy.

8. United States Senators do not perceive a need in rural America for CES programs concerning cultural and recreation topics.

5. There were no significant differences observed among respondents who have and have not served on the U.S. Senate Committee on Agriculture concerning home economics and human resource development functions lower than did their colleagues with less tenure.

6. Republicans and democrats differed greatly with respect to the perceived importance of home economics and human resource development functions. Republicans rated all home economics and human resource development functions lower than did democratic respondents, and significant differences were observed for the following functions: provide technical and practical knowledge in family resource management; provide leadership development training; provide training in organizational and interpersonal skills; and provide life long learning opportunities through continuing education courses.

IMPORTANCE OF 4-H AND YOUTH DEVELOPMENT FUNCTIONS

1. Respondents generally gave high importance ratings to 4-H and youth development functions. Respondents indicated that the most important 4-H and youth development functions were providing leadership training for youth members and providing skills and knowledge in science and technology, with emphasis on agriculture and home economics.

2. There were no significant differences observed among respondents who have and have not participated in CES programs with respect to the perceived importance of 4-H and youth development functions.

3. Respondents from different geographic regions generally agreed on the importance of 4-H and youth development functions, but senators from the western region gave a significantly lower importance rating to the function of conducting camping and outdoor recreation programs for youth members.

4. Respondents with less than ten years of experience inthe U. S. Senate rated the function of assisting young people with the exploration and evaluation of career and job opportunities significantly higher than did respondents with more than ten years of experience.

5. A significant difference was observed among respondents who have and have not been members of the Senate Committee on Agriculture concerning 4-H and youth development functions. Respondents who have been members of the Senate Committee on Agriculture gave a significantly higher importance rating of the function of providing leadership training for youth members.

6. A significant difference was observed between republicans and democrats when 4-H and youth development functions were analyzed. Republican respondents gave a significantly lower importance rating to the function of conducting camping and outdoor recreation programs for youth members, than did respondents who claim allegiance to the democratic party.

9. United States Senators from southern and north central states place a higher value than senators from other states on CES programs that are beneficial to producers of agricultural products.

10. A majority of United States Senators have participated in CES programs, and senators from the southern and north central regions of the country are more likely to have participated in CES programs than are senators from the north-east and western regions.

11. In general, senators who have participated in CES programs do not perceive CES programs differently than senators who have not participated in CES programs.

12. Differences exist among senators from various geographic regions regions regarding perceptions of importance of CES programs.

13. Overall, senators who serve on the U.S. Senate Committee on Agriculture do not perceive CES programs differently than do senators who do not serve on the Agriculture Committee.

14. Republican and democratic senators differ with respect to the importance they place on CES program emphasis. Republican senators tend to consider home economics and human resource development functions and community and natural resource development functions as less important than do democratic senators.

RECOMMENDATIONS

From the review of literature and the results of this investigation, the following recommendations are being proposed by the investigator:

1. CES administrators should provide legislators at all levels of government with data concerning the needs of CES audiences. CES administrators should inform legislators of the rationale for implementing different CES programs.

2. CES administrators should provide legislators with reports of progress and achievement, so legislators will become aware of CES accomplishments.

3. State CES directors should seek to develop and utilize appropriate channels of communication with U.S. Senate and Congressional representatives from their states.

4. CES professionals at the county and area levels should seek to develop working relationships and channels of regular communication with local officials and state-level representatives. These legislators should be involved with program planning and should be made aware of local accomplishments of the CES.

5. CES administrators should compare views of legislators with current program thrusts, and determine if a significant gap exists between the two ideologies. If significant differences are observed, CES administrators should develop strategies to eradicate such differences.

THE ROLE OF EXTENSION IN RURAL AMERICA AS PERCEIVED BY UNITED STATES SENATORS

A Critique

Dennis C. Scanlon, The Pennsylvania State University -- Discussant

First, let me commend the researchers for undertaking a task of tremendous difficulty, i.e., measuring the perceptions of 100 U. S. Senators on their understanding of Cooperative Extension Service programs throughout the country. However, let me caution the researchers on drawing conclusions and making recommendations based on a 47 percent response. The chi square test used for non-response bias only indicates that the frequency of responses in the non-response group would be expected to be the same on the variables geographic region and party affiliation and does not permit the researchers to generalize to the total target population in regards to their perceptions. The question arises why only these two moderator variables were selected and not other variables such as participation in C.E.S. programs and tenure in the U. S. Senate or on the U. S. Senate Committee on Agriculture. I suspect these variables were chosen because they were data the researchers had available and did not necessitate additional data collection. A better procedure would have been to collect data from a random sample of non-respondents and use a t test to compare the mean scores, for significant differences. The conclusions and recommendations made in this paper are "chancy" at best and are not supported by the data. The validity of the conclusions would have been considerably enhanced by qualifying the statement as per the data collected.

In addition, I would suggest that the problem statement and objectives of the study provide the reader with an accurate description of what is to be done. The addition of the moderator variables later in the study served to confuse the overall issue of what independent variables were really being studied. The influence of the moderator variables as they impact on Senators' perceptions could have been easily shown in a contingency table using a cross tabulation method of analysis.

I also raise the question why analysis of variance techniques were used to measure overall significance differences in expressed importance of C.E.S. functions by the five moderator variables. Since analysis of variance is an inferential statistic, i.e., used to determine the inferred mean of a population from a sample, it is not an appropriate statistic when the entire population is used. Standard descriptive reporting methods which use contingency and frequency tables would have been helpful in interpreting results. Practical levels of importance would have better than statistical levels of significance.

A final question to be raised regards the validity and stability of the data collected. Did Senators actually fill out the survey instruments or were they completed and returned by senatorial aides? Regarding stability, it has been my experience that trying to get a politician to take a solid position on any issue is like to trying to nail jello to a tree...a very difficult task indeed.

The researchers would have been better off to descriptively report on the data they were able to collect and let the readers draw their own conclusions regarding future courses of action.

VIDEO SIMULATION AS A COMPUTER APPLICATIONS INSTRUCTIONAL TECHNIQUE FOR AGRICULTURAL PROFESSIONALS AND STUDENTS

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INTRODUCTION

Computers are used in agricultural business and industry as tools to aid in record keeping and decision making. Government agencies such as the Agricultural Stabilization and Conservation Service and Cooperative Extension Service use them as aids in conducting agency activities. In production agriculture, the increasing use of computers helps the farmer keep records and make important financial decisions. Computing skills are now needed in most agricultural occupations. Cone (1986) stated that "Every high school vocational agriculture student should be equipped with computer literacy" (p. 15). Estimates indicate that "80% of students currently in school will technologically manipulate information in their work by the year 2000" (Valdez, 1986 p.5). These skills require that the student be able to use various forms of application software; software designed to solve specific types of problems.

Literature and research in agricultural and Extension education further document the need on the part of students (Newman, 1986; and Schaff, 1985), vocational agriculture teachers (Bowen, 1984; Henderson, 1985; Miller & Kotrilik, 1987; and Whitehead, 1985), postsecondary agriculture teachers (Berkey & Sutphin, 1984), and Cooperative Extension Service agents (Earnest, 1986) for competencies in using applications software. Instruction in the use of computer applications must expand to meet the needs of agricultural business and industry.

There are several approaches to instruction in the use of computer application software. The most common form of initial instruction observed is lecture/recitation; cognitive information provided with application through supervised laboratory instruction. Another approach to computer application is the use of disk-based tutorials. Both approaches assume adequate amounts of computer hardware and software . . . a luxury most vocational agriculture teachers do not enjoy (Whitehead, 1985).

An alternative method of instruction may be the use of teacher prepared video recordings of software, in a fashion similar to that displayed by disk-based tutorials. By combining video replay of the software with a dummy keyboard to provide practice, an actual computer can be simulated.

REVIEW OF RELATED RESEARCH

Cognitive instruction has successfully been delivered through the use of various media. Prerecorded video has been used successfully to provide instruction in psychology (Sullivan, Andrews, Maddigan, and Noseworthy, 1979), mathematics (Backens, 1970), and chemistry (Levine, 1974). Simulation has been defined as "the creation of a realistic environment using lifelike problem solving activities which are related to present or future real occupational experiences" (Hamilton, 1977 p.3). Simulation has been successfully used for instruction in psychomotor (Agnew, 1985) and cognitive skills (Bredemeier & Greenblat, 1981; Dekkers & Donatti, 1981).

Combining video instruction and simulation as an instructional technique may be useful in developing needed skills in computer applications. From the review of research, it was hypothesized that students are instructed in computer applications software through the use of a supervised laboratory method versus video simulation, no differences in the abilities of the students to use application software will be observed. Further, there will be no differences in the retained abilities of the students when using selected application software.

PURPOSE AND OBJECTIVES

The purpose of this investigation was to study the problem: What are the learning outcomes, as determined by scores on a practical application activity, of students being taught computer applications software by a supervised laboratory method as compared to those taught by a video simulation method. The specific hypotheses tested (alpha = .05) were:

1. When students are instructed in the use of spreadsheet software with a supervised laboratory method versus video simulation, there is no significant difference in mean times required to complete a spreadsheet worksheet.
2. When students are instructed in the use of spreadsheet software with a supervised laboratory method versus video simulation, there is no significant difference in mean scores for use of proper commands required to complete a spreadsheet worksheet from a given problem.
3. When students are instructed in the use of data base management software with a supervised laboratory method versus video simulation, there is no significant difference in mean times required to complete a given data base problem.
4. When students are instructed in the use of data base management software with a supervised laboratory method versus video simulation, there is no significant difference in mean scores for proper use of commands required to complete a given data base problem.
5. When students are instructed in the use of spreadsheet software or data base software with a supervised laboratory practice method versus video simulation, there is no significant difference in mean scores for retained ability to use proper commands.

PROCEDURES

The population consisted of students enrolled and participating in three intact laboratory sections of "Application of Computer Technology to Agricultural and Extension Education" during the spring semester, 1987, at Mississippi State University. Subjects were randomly assigned by lab section to one of two treatment groups: X1, instructional delivery through supervised laboratory (control group); X2, instructional delivery through video simulation (experimental group). The laboratory instruction (X1) was delivered by the researcher following prepared objectives and procedures. The instruction consisted of four hours of a step-by-step process using the microcomputer to prepare a spreadsheet worksheet (replicate one) or a data base (replicate two) for a selected problem. Instructional content for the video simulation group (X2) followed the same teaching plan, but consisted of a direct video recording from the microcomputer of the same four hour step-by-step process required to construct the spreadsheet worksheet (or data base), incorporating the same commands required to complete the selected activity. A simulated keyboard was provided to each student in the experimental group so that all students received practice. The video recordings had dubbed instructions explaining verbally the process of constructing the spreadsheet worksheet (or data base), identical to the instructions provided to the control group. Audiotapes were made at random intervals during the supervised laboratory instruction and later compared to the video recordings as a control for researcher talk. When the audiotapes were compared to the video recordings, no appreciable differences were found.

Subjects for study were obtained from available intact groups since random sampling procedures were not feasibly applied to the available population. Manipulation, however, was possible through the random assignment of the level of treatment to groups. Following a clinical model, the appropriate design became a posttest-only control group design (Campbell & Stanley, 1963). This design employed a counterbalanced extension, in which the control and treatment groups were rotated, as a means of internally replicating the study.

Table 1
Counterbalanced Extension of a Posttest-Only Control Group Design

		Replicate 1 (Spreadsheet)	Replicate 2 (Data Base)
Group 1	Lab A	R X1 O	R X2 O
	Lab B	R X1 O	R X2 O
	Lab C	R X1 O	R X2 O
Group 2	Lab A	R X2 O	R X1 O
	Lab B	R X2 O	R X1 O
	Lab C	R X2 O	R X1 O

Note. Lab = Separate laboratory sections of AEE 5203/7203, Application of Computer Technology to Agricultural and Extension Education. Group 1 = One half of the students, chosen at random, from each section. Group 2 = Second half of students, chosen at random, from each laboratory section. R = Random assignment of treatment to groups; X1 Supervised laboratory instruction (control group); X2 = Video simulation instruction (experimental group); O = Observation of treatment effects (Campbell & Stanley, 1963).

Upon completion of each treatment, all subjects were required to complete a practical application activity using the computer. This activity consisted of solving a written problem that required the use of the computer and software commands taught during treatments. Validity of the assessment activities was determined by a panel of experts. The reliability of the criterion referenced evaluation of the assessment activities was established by scoring the completed assessment activities twice. The first scoring was conducted immediately following the completion of the activity. The second scoring was done two weeks later. After the second scoring was completed, the two sets of scores were compared. Only one criterion of 592 possible was scored differently, yielding a scoring replicability of 99.83%.

ANALYSIS OF DATA

Means and standard deviations of assessment activity scores and time needed to complete the assessment activities were determined. Although not normally appropriate in a population study, analysis of variance (ANOVA) was calculated so that inferences might cautiously be made to similar intact groups. Data collected from the two internal replications (spreadsheet and data base) were analyzed separately with retention scores grouped for analysis.

RESULTS

The average age of the subjects was approximately 30; all were over 21 years of age. Few of the subjects indicated prior computer experience with most of the subjects indicating limited typing proficiency. Six of the 16 subjects spoke a native language other than English, with greater than one half of the subjects pursuing graduate degrees.

Hypotheses one and two were concerned with the spreadsheet activity (See Table 2). The mean time required to complete the activity by the experimental group (video simulation method) was four minutes more than that of the control group (supervised laboratory method). This difference was not statistically significant. A difference of four minutes of the 91 minutes required by the control group to complete the activity was of little practical significance. The standard deviations were 25.16 and 29.35, respectively, for the control and experimental groups, indicating greater consistency in performance of the subjects in the control group. The variation of performance scores between the two groups was more noticeable than the time differences. The mean score of the control group was 19 points (13.67%) higher than that of the experimental group (150 points possible). The standard deviation for the experimental group was 37.41 while that of the control group was 10.00, indicating that instruction provided by the supervised laboratory method resulted in greater consistency of performance.

Table 2
Means, Standard Deviations, and *F*-Ratios of Spreadsheet Assessment Activity Times of Completion and Scores

	$\bar{X}$	SD	*F*
Time			
X1	91	25.16	
X2	95	29.35	0.09
Scores			
X1	140	10.00	
X2	121	37.41	1.75

Note: X1 = Supervised laboratory instruction (control group); X2 = Video simulation instruction (experimental group).

Much of the variation between the experimental and control groups on the spreadsheet activity (replicate one) was a result of a single subject. That subject was part of the experimental group and required 155 minutes to complete the assessment activity; the score on the completed activity was 35

(150 possible). Data were reanalyzed with the score of this subject omitted. The mean time required to complete the activity dropped from 95 minutes to 86.43 minutes. The mean time for the control group was 91 minutes. The standard deviation for the experimental group dropped from 29.35 to 17.86. The standard deviation for the control group was 25.16. Reanalysis of the data for the scores increased the mean score for the experimental group from 121.00 points to 134.29 points (150 possible). The mean score for the control group was 140.00 points. The standard deviation dropped from 37.41 to 13.97 for the experimental group with the standard deviation of the control group being 10.00. With the score and time of the one outrider omitted, the time required for completion by the experimental group was less than that required by the control group.

Hypotheses three and four dealt with replicate two; the learning outcomes of data base instruction (See Table 3). In the data base assessment, there were no outriding subjects. The consistency of the scores for both groups indicated that all students achieved mastery of the skills taught. The only observed difference between the experimental and control groups was time to complete the assessment activity. The subjects instructed by the video simulation method required 12 minutes more than those instructed by the supervised laboratory method. The mean times were 44.88 and 56.88, respectively, for the control and experimental groups. This difference in time may be of practical significance. The experimental group required 26.74% more time to complete the activity to the same standard. The standard deviation for time of the experimental group (14.91) was of lesser magnitude than that of the control group (15.00). This difference was of no practical significance.

Table 3
Means, Standard Deviations, and F-Ratios of Data Base Assessment Activity Times of Completion and Scores

	$\bar{X}$	SD	F
Time			
X1	44.88	15.00	
X2	56.88	14.91	2.57
Scores			
X1	53.75	2.31	
X2	53.75	2.31	0.00

Note: X1 = Supervised laboratory instruction (control group); X2 = Video simulation instruction (experimental group).

Hypothesis five dealt with retention of learning (See Table 4). The test for retention found the mean score of the experimental group at 3.75 points (5.00 possible) and the mean score of the control group at 4.38 points. The difference in retention scores was not great enough to be of practical significance. The standard deviation of the control group was 1.18; lower than that of the control group (1.20). There was no practical significance to this difference.

Table 4
Means, Standard Deviations, and F-Ratios of Retention Scores

	$\bar{X}$	SD	F
Supervised Laboratory Instruction (X1)	4.38	1.20	
Video Simulation Instruction (X2)	3.75	1.18	2.19

The effect of the treatment (video simulation) yielded results for time required to complete a given activity that were not statistically significant: (spreadsheet) F (1,15) = .09, $p > .05$; (data base) F (1,15) = 2.57, $p > .05$. Scores for proper use of commands required to complete a given activity were found to be not significantly different: (spreadsheet) F (1,15) = 1.75, $p > .05$; (data base) F (1,15) = 0.00, $p > .05$. Analysis of variance failed to reject all null hypotheses.

The effect of the treatment on retention of learning for proper use of commands was also found to be not significant; (spreadsheet and data base combined) F (1,31) = 2.19, $p > .05$. Analysis of variance failed to reject this hypothesis.

CONCLUSIONS AND/OR RECOMMENDATIONS

The findings of this investigation support those of Backens (1970), Levine (1973), and Sullivan, Andrews, Maddigan, and Noseworthy (1979), who found no significant difference in immediate learning outcomes when instruction was provided by video. The findings of this investigation conflict with the findings of Kulik, Kulik, and Cohen (1979); and Randall (1985) who found immediate learning outcomes to be greater when instruction was provided through video. Retention of learning was found to be increased by the use of video by Sullivan, Andrews, Maddigan, and Noseworthy (1979); the results of this study conflict with this finding.

Simulation activities have been studied to determine both immediate learning outcomes and retention. Bredemier and Greenblat (1981) and Dekkers and Donatti (1981) were in agreement that simulation activities resulted in no significant difference in immediate learning outcomes. These findings were supported in this study. Dekkers and Donatti (1981) found no significant difference in retention over traditional methods; findings which are supported by this investigation. The findings of this investigation are in conflict with Agnew (1985) and Bredemeier and Greenblat (1981), who found that simulation activities resulted in increased retention.

Limitations of equipment and software were identified as major obstacles to teaching computer applications to students (Whitehead, 1985). Video recordings of software coupled with dummy keyboards can be used to effectively teach computer applications to students when adequate equipment or software is not available.

Using a video simulation activity holds several advantages over supervised laboratory methods. The most obvious advantage is the cost benefit. With a computer costing approximately $1,000 and software costing anywhere from $75 to $700, an instructor could quickly drain an entire operating budget and still not have sufficient numbers of computers or software for supervised laboratory instruction. For the price of two computers, the same instructor could purchase a single computer and video recording equipment, and have the capability of providing video simulation instruction to an entire class.

Video simulation activities could be used in combination with supervised laboratory instruction when equipment is limited. Students could be instructed successfully using the simulation activity and rotated through supervised laboratory instructional methods, utilizing the computers that were available. Students would receive practice through both the video simulation and through the use of the computer. By rotating students through supervised laboratory instruction, each student would get a chance to refine skills as well as experiment with the capabilities of the machine.

Although beyond the bounds of this investigation, vicarious benefits of video simulation of software observed during the investigation included:

1. Video simulation is consistent in instructional content. If the video recording is properly planned, recorded, and validated the instructor can be sure that the students are receiving accurate and consistent information every time.
2. The use of prerecorded video may save instructional time. Prerecorded videos allow the student to review specific parts of the process. Using the rewind and fast forward capabilities of the VCR, the student can quickly review a process or sequence.
3. Video recordings developed by teachers can be problem specific; separate video recordings could be developed for different activities. A recording could be made for the development of enterprise budgets, balancing feed rations, calculating depreciation, and other needed activities.
4. Video simulation activities may be used for remediation and enrichment for students.

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VIDEO SIMULATION AS A COMPUTER APPLICATIONS INSTRUCTIONAL TECHNIQUE FOR AGRICULTURAL PROFESSIONALS AND STUDENTS

A Critique

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We are fast approaching the point where most people will require use of a computer in some way nearly every day. The need to teach young people to make efficient use of computer technology is clear as they prepare themselves for the future. This study addressed the general question, "What are the most effective techniques for teaching computer use?". More specifically, the study compared the completion time and effectiveness of video simulation versus supervised laboratory instruction for teaching college students to use applications software. The researchers found no differences between the two approaches.

There are many aspects of this paper that serve as good examples for other researchers to model. The introduction described the importance of computer literacy and the extensive use of applications software. An extensive review of the literature was provided. In general, this paper was very well written, complete, clear, and well founded in the literature. The research problem, purpose of the study, and statistical hypotheses were clearly stated. The treatment, as well as the research design, was well described and documented. Internal replication strengthened the internal validity of the study. Validity and reliability of the assessment activities were established. The statistical and practical significance of all findings were addressed in a straightforward manner. Statistical analysis techniques used were appropriate, although the researchers recognized the unnecessary use of inferential statistics. The implications of the results were discussed in some detail, along with recommendations for practice.

The following ideas/questions are offered for the purpose of improving this paper and similar studies in the future. While the researchers noted the limited amounts of computer hardware available to most secondary agricultural teachers, the availability of videotape equipment was not discussed. Is there a real resource advantage with video simulation? The areas of greatest concern to me in this paper were (1) small population size and (2) lack of generalizability of the results. The authors only indirectly mentioned a population of 16, with a total of eight students in each of the two groups. What effect did this small group size have on the statistical significance of the results? Why were the three lab sections split in half?

Generalizability of the findings was not claimed, yet was suggested. Nearly 40 percent of the subjects spoke a native language other than English, one subject's performance was extremely low, and the average age of the subjects was 30. Generalization of the findings of this study would seem risky, at best. I needed more information about the nature of the retention assessment and the rationale for grouping retention scores. I was also curious as to why the researchers originally hypothesized no difference between the two techniques under investigation. Suggestions for further research were needed, given the contradictory results found in the literature. Finally, student satisfaction with the instructional technique should also be measured as a component of overall effectiveness of video simulation.

VOCATIONAL AGRICULTURE PROGRAM QUALITY AND FACTORS RELATED TO PROGRAM QUALITY

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INTRODUCTION

Excellence in vocational education has become a major concern of vocational educators and the general public. The call for excellence has come at a time of rapid social and technological change coupled with fierce competition for public funds. These concerns have placed additional demands on vocational educators to improve program quality (McKinney, Farley, Smith, Kohan, & Pratzner, 1985). Since vocational agriculture is considered one of the areas within vocational education, the concerns for excellence in vocational agriculture are just as important. Program quality becomes tangible only through measurement of the attributes associated with the vocational agriculture program. A quantitative measure can be placed upon the concept of quality through the evaluation of those characteristics that can be measured in both a valid and reliable manner.

Past research has defined the concept of program quality narrowly as instructional effectiveness and has measured this construct using standardized achievement tests. This approach ignores the variety of school goals and yields measures of school effectiveness that are invalid and unreliable (Rowan, Bossert, & Dwyer, 1983). Mackenzie (1983) presented another view in stating that there is seldom clear agreement on the precise definition of constructs and variables measuring school effectiveness. Vocational agriculture education has attempted to resolve the issue of measuring school effectiveness through the development of program standards suitable for assessing program quality. The Standards for Quality Vocational Programs in Agriculture/Agribusiness Education (1977) were developed through a series of national meetings of state supervisors, teacher educators and vocational agriculture teachers. The standards were developed by the profession as a whole and have traversed a lengthy process of refinement and validation. These standards were developed by the profession to serve as a model against which all existing agriculture/agribusiness programs and activities can be evaluated.

Many factors have been identified as affecting program quality in vocational agriculture in secondary school systems. Those factors include teacher characteristics (Dunathan, 1980; Murray, 1980), the funding of the program (Johns, Morphet, & Alexander, 1983; Walter, 1986), and characteristics of the school (Eberts, Kehoe, Stone, 1984). However, few have speculated about the influence of educational supervision in developing program quality in vocational agriculture. Of most recent writing, Foster and Horner (1986) offer that the quality of vocational agriculture in a state reflects the state-level leadership. Barrick (1980) has isolated the role of supervision as program improvement with the ultimate objective of quality programs in vocational agriculture. Barrick found that state supervisors and teachers of vocational agriculture believe that program improvement is a high priority in the realm of the state supervisor job responsibilities.

PURPOSES AND OBJECTIVES

This study was designed to answer the following questions:

1. What is the level of program quality in secondary vocational agriculture programs in the United States as measured by the Standards for Quality Vocational Programs in Agriculture and Agribusiness through the perceptions of the teachers of vocational agriculture?
2. What is the relationship between program quality and the following selected program variables?
    - A. State level supervision of vocational agriculture education: (1) duties of the state supervisor; (2) state level hierarchy for the administration of state level supervision; and (3) state structure of supervision.
    - B. Teacher variables: (1) degree major at the beginning of the teaching career; (2) level of education achieved; (3) type of institution granting highest degree; (4) recentness of earning highest degree; (5) years of teaching experience; and (6) type of responsibility for adult education in agriculture.
    - C. Characteristics of the school: (1) type of high school; (2) number of teachers in the department; (3) number of students in the vocational agriculture program; (4) number of students in the high school; (5) percent of time spent teaching high school vocational agriculture; and (6) percent of rural, suburban and urban students in vocational agriculture program.
    - D. Fiscal support for the vocational agriculture program: (1) vocational agriculture teacher's annual salary based upon the percent of time spent teaching vocational agriculture; and (2) total level of financial support for instructional materials, new equipment, consumable supplies, travel and inservice.
3. What variables account for the variance in program quality?

PROCEDURES

The target population for this study was all high school vocational agriculture programs in the public schools of the United States during the 1986-87 school year. The list of programs came from the 1986 Agriculture Teachers Directory published annually by Smith Publications. To achieve a representative sample, the formula for estimating sample size developed by Cochran (1977) was used. From a population of 11,750 high school teachers, a sample of 567 was randomly drawn.

The design for this study was correlational. An instrument to assess the dependent variable program quality was developed by the researcher based upon the Standards for Quality Programs in Agriculture/Agribusiness Education. The instrument was reviewed by faculty members of the Department of Agricultural Education at The Ohio State University and by the Ohio Agriculture Education Service state supervisory staff to assure content validity. The instrument was field tested to establish reliability and face validity. The field test was based on a random sample of vocational agriculture programs not selected to participate in the study and conducted in a manner as close to the final format as possible. Utilizing Cronbach's Alpha, instrument reliability was .94.

The instrument was divided into two sections. Part I consisted of 55 items that required the teacher to rate their program in comparison to other vocational agriculture programs in the state. A Likert-type scale was used with five equal to excellent in comparison to other programs in the state, four equal to much better than other programs in the state, three equal to about the same as other programs in the state, two equal to not as good as other programs in the state, and one representing much worse when compared to other programs in the state. The other 48 statements regarding program quality asked the teacher to indicate if the statement was true for his/her program. A YES response was coded as a 5, and the NO response was coded as a 1.

The instrument also quantified the four categories of independent variables teacher variables, school characteristics, program funding level and supervisory structure.

RESULTS

Of the 567 high school vocational agriculture teachers sampled, 394 questionnaires (69%) were returned. Since a comparison of the early and late respondents found no significant difference and since late respondents are similar to non-respondents, generalization can be made to the entire sample (Miller & Smith, 1983).

The average vocational agriculture teacher held a bachelor's degree with a major in agricultural education from a land grant institution. The teacher had been teaching for 11 years in a single teacher department with 66 students in a comprehensive high school with 177 students per grade. The typical high school vocational agriculture program is composed of 51% rural, 28% suburban and 21% urban students. While the typical teacher teaches vocational agriculture 90% of the school day, she/he does not work with adults. Only 16% of the teachers work with adults throughout the year. The average salary was $27,000, and the teacher has approximately $400 per year for instructional materials, consumables, new equipment, SOEP travel, FFA travel and inservice education.

Total program quality scores ranged from a low of 2.10 to a high of 4.90 on the 5 point scale. The largest proportion of programs (42.13%) scored in the 3.50 to 3.99 range. Only 22 programs (6.18%) scores less than 3.00. A total of 99 programs (24.81%) reported mean quality scores of 4.00 or greater.

The variable duties of the state supervisor was categorized into those states where the state supervisors have duties beyond the supervision of vocational agriculture, and states where the state supervisors are responsible only for vocational agriculture. Barrick (1980) proposed that the more desirable state supervisory duties would be limited to the supervision of vocational agriculture education. Therefore, the duties of the state supervisor was treated as an ordinal variable, and a Spearman rank-order correlation coefficient was calculated between duties of the supervisor and program quality. A negligible association (r_s=.08) was found between the duties of the supervisor and program quality, not significant at alpha=.05 (Table 1).

The state level administration of vocational agriculture education occurs either through the head state supervisor reporting directly to the state director of vocational education or not reporting directly to the state director. As Barrick (1980) proposed, the more desirable hierarchy would provide for direct reporting to the state director of vocational education. No association (r_s=.00) was found between supervisory hierarchy and program quality.

Based upon the duties of the state supervisor and the relation of state supervision to the state director of vocational education, four structures were identified. Placing these four categories into a ranking of least desired to most desired structure in the administration of vocational agriculture, a Spearman rank-order correlation coefficient was calculated between program quality and state structure. A negligible association (r_s=.08) was found between the variables supervisory structure and program quality, not significant at alpha=.05 (see Table 1).

A negligible negative association (r_s=-.04) was found between the variables degree major and program quality, not significant at alpha=.05 (see Table

Table 1

Relationship Between Program Quality and Duties, Hierarchy and Structure of State Level Supervision

Variables	r_s	Number of Cases	p
Program quality with duties of state supervisor	.08	356	.057
Program quality with hierarchy of state supervision	.00	356	.488
Program quality with structure of state supervision	.08	356	.069

Table 2

Relationship Between Program Quality and Selected Teacher Variables

	r	r_s	Number of Cases	p
Program quality with college major		-.04	356	.252
Program quality with degree level achieved		.07	356	.086
Program quality with type of institution awarding highest degree		-.09	356	.046
Program quality with recentness of achieving highest degree	.05		356	.189
Program quality with years of high school vo-ag teaching experience	.19		355	<.001
Program quality with teacher's instruction of adults		-.29	348	<.001

2). The variable level of education achieved was treated as an ordinal measure. A negligible association (r_s=.07) was found, not significant at alpha=.05.

Type of institution was coded with high school receiving a ranking of 1, non-land-grant university or college a rank of 2 and land grant university receiving a ranking of 3. A negligible negative association (r_s=-.09) was found, significant at alpha=.05 (p=.046).

A Pearson product moment correlation coefficient was calculated between program quality and the measure of recentness of achieving the highest degree with a negligible association (r=.05) not significant at alpha=.05 (Table 2). The Pearson product-moment correlation coefficient was calculated between program quality and years of teaching experience. A low degree of association (r=.19) was obtained, significant at alpha=.05.

The variable type of responsibility for adult education required the teacher to identify the degree of interaction with adults. The responses to this variable were coded with the greater the interaction with adults, the lower the coding number. A low association (r_s=-.29) was obtained, significant at alpha=.05, indicating that the greater the level of formal instructional interaction with adults, the greater the program quality.

Six school characteristics were selected for the study. Using a Spearman rank-order correlation coefficient, a negligible association (r_s=.02), not significant at alpha=.05, was achieved between program quality and the type of school where the vocational agriculture program is located (see Table 3).

Table 3

Relationship Between Program Quality and Selected School Characteristics

	r	r_s	Number of Cases	p
Program quality with type of school where vo-ag program is located		.02	356	.389
Program quality with number of teachers in the department	.18		356	<.001
Program quality with number of students in the vo-ag program	.12		352	.013
Program quality with number of students in each grade of the high school	.17		344	.001
Program quality with the percent of school day spent as a vo-ag teacher	.18		353	<.001
Program quality with percent of rural students in the vo-ag program	-.07		353	.082
Program quality with percent of suburban students in the vo-ag program	.03		352	.287
Program quality with percent of urban students in the vo-ag program	.10		353	.028

A Pearson product-moment correlation coefficient was calculated between the variables program quality and the number of teachers in the department. A low association (r=.18) was realized, significant at alpha=.05 (p=.001).

Pearson product-moment correlation coefficients were calculated between program quality and the number of students in the department and the number of students per grade. A low association (r=.13) was found between program quality and the number of students in the program, significant at alpha=.05 (p=-.013). A low association (r=.17) was also found between program quality and the number of students per grade in the high school, significant at alpha=.05 (p=.001).

A low association (r=.18) was found between the percent of the school day spent teaching vocational agriculture and program quality, significant at alpha=.05 (p=.001).

Pearson product-moment correlation coefficients indicate a low association (r=-.07, .03 and .10) between program quality and the percent of students who lived in a rural, suburban or urban area, respectively. Of the three correlation coefficients, only the relationship between program quality and the percent of students who lived in an urban area was found to be statistically significant (p=.028).

A Pearson product-moment correlation coefficient was calculated between program quality and the teacher's annual salary adjusted for the percent of the school day spent teaching vocational agriculture. A low degree of association (r=.26) was obtained, significant at alpha=.05 (p<.001)(see Table 4). A

Pearson product moment correlation coefficient was calculated between program quality and the amount of dollars available for program support per teacher. A low association (r=.14) was obtained, significant at alpha=.05 (p=.005).

Table 4

Relationship Between Program Quality and Fiscal Support for the Vocational Agriculture Program

	r	Number of Cases	p
Program quality with teacher's salary based on percent of time teaching vo-ag	.26	351	<.001
Program quality with amount of resources available per teacher	.14	339	.005

Ten independent variables were identified as statistically significant and entered in single steps into the multiple regression equation. This procedure allowed the researcher to partial out the effects of a single variable at each step, while all variables were statistically controlled. Table 5 indicates the intercorrelations between the four variables entering into the regression equation. A low degree of association was found between teacher salary and number of teachers and between teacher salary and dollars available for program support. A moderate, negative association was found between number of teachers in the department and the dollars available for program support.

Table 5

Intercorrelations Between Independent Variables Which Account for Program Quality in the Regression Equation (n=329)

	Intercorrelations				
	Teach Adults	Adjusted Salary	Number of Teachers	Dollars Available	Program Quality
Teach Adults	1.000	-.056	.022	-.080	-.287*
Adjusted Salary		1.000	.173*	.135*	.261*
Number of Teachers			1.000	-.395*	.180*
Dollars Available				1.000	.143*
Program Quality					1.000

*p$\leq$.005.

The first variable to enter into the regression equation was the type of responsibility for adult education in agriculture (see Table 6). This variable accounts for the greatest degree of variance in program quality, 8.1%. The adjusted salary of the vocational agriculture teacher accounts for another 6.7% of the variance. The final two variables, number of teachers and dollars available for program support, account for 2.6% and 1.9% of the variance, respectively.

Table 6

Regression of Program Quality on Select Variables (n=308)

Independent Variables Entered Into Equation*	R	R^2	Change In R^2	Partial Regression Coefficient	F**
Teach adults	.2848	.0811	.0811	-.160	27.54
Adjusted salary	.3844	.1478	.0666	.121 E-4	26.96
Number of teachers	.4171	.1740	.0262	.083	21.77
Program support resources	.4393	.1930	.0190	.279 E-3	18.48
Constant				3.544	

*Each variable was added to the regression equation in a single step. **All F values were significant at $p<.001$.

CONCLUSIONS AND RECOMMENDATIONS

Vocational agriculture teachers perceive their programs to be better than other programs in their state. The teachers in the sample indicated that their programs were, on the average, better than other programs in the state using the scale of 5=excellent, 4=much better, 3=about the same, 2=not as good, and 1=much worse.

The duties of the state supervisor, the hierarchy of state supervision in vocational agriculture and the structure of state supervision are not related to program quality.

A low negative association was found between program quality and the type of responsibility for adult education in agriculture. Teachers who were responsible for adult education in agriculture perceived their level of program quality higher than other teachers. A low positive association was found between program quality and years of teaching experience. The longer the teaching experience, the greater was the perceived level of program quality. The type of institution awarding highest degree was found to be related to program quality.

Several selected school characteristics were found to be associated with program quality. The higher the number of teachers in the department, the greater the program quality. The size of the vocational agriculture program and number of students in the high school appear to be related to program quality. Increased enrollment in the vocational agriculture programs and programs located in larger schools were found to be associated with higher program quality. The type of student enrolled also was related to program quality. A greater percent of students who lived in an urban area was found to be associated with greater program quality. The percent of the school day spent teaching vocational agriculture was also found associated with program quality. The increased percent of the school day spent teaching vocational agriculture was found associated with greater program quality. However, several variables were not found to be associated with program quality. Those variables included the type of school where the program was located and the percent of rural and suburban students.

The level of financial support for the program was related to program quality. A low positive association was found between program quality and the adjusted annual salary of the vocational agriculture teachers. The amount of dollars available per teacher for program support was also related to program quality in a similar manner. As the amount of funds available increased, the level of program quality increased.

This study indicates that a low relationship exists between perceived level of program quality and the teacher's responsibility for adult education in agriculture. As declining enrollment continues, especially in the programs, the addition of adult program may appear to be an easy solution. However, cognizant of the type of researcher conducted, the use of cause and effect statements are not in order. Therefore, to imply program quality can be enhanced through work with adults cannot be made. Further study is recommended into this relationship.

Program funding level accounted for slightly more than 9% of the variance in program quality. To expect a substantial increase in program quality through expensive vocational agriculture programs does not appear logical.

Finally, the number of teachers in the vocational agriculture program was found to be positively related to program quality. This demonstrates that the continued comparison of single and multiple teacher programs gives the advantage to the larger departments. Multiple teacher programs appear to have the advantage in providing higher levels of program quality.

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VOCATIONAL AGRICULTURE PROGRAM QUALITY AND FACTORS RELATED TO PROGRAM QUALITY
A Critique

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Let me begin by commending the researchers for a very fine study. The conceptual base has been very well developed, the dependent and independent variables to be studied are clearly defined, the research design is meticulously laid out and the statistical analysis is appropriate. I would especially like to commend the researchers for resisting the temptation to go beyond the data and make conclusions and implications that cannot be supported. In essence we have a textbook case of how research should be done...but it seems sterile. It leaves me with the question: ok, what now? The researchers identified ten independent variables related to program quality and entered each into a stepwise multiple regression equation to determine percentage of significance explained by each. Four variables explained approximately 20 percent of the variance while the remaining six explained a negligible amount. The researchers were quick to point out that the reader could not assume a cause and effect or even an implied relationship, since all the research variables showed a low association with the dependent variable and explained such a small percentage of the variability t. In effect what this study has told us is that vocational agriculture teachers perceive the quality of their programs to be high in relation to the national standards for vocational agriculture programs, and in relation to other vocational programs in their states...but we don't know why. To me, the data suggest, although not conclusively, that the teacher is still the key to program quality.

If research is supposed to contribute to an existing body of knowledge, then I raise the question: can we afford to spend time eliminating all the variables not related to quality programming in an attempt to identify those which are left as related to quality programming? As far back as 1974, Dunkin and Biddle identified presage and context variables as having little effect on quality programming as defined by effective teaching. I would suggest the researchers contribute to the body of knowledge which is attempting to explain the phenomena of what is a quality program by carefully examining the existing body of knowledge, setting directional hypotheses that concentrate on possible solutions to the problem, and then proceeding to apply the rigorous research techniques that the writers obviously possess.

ASSESSMENT OF THREE MICROCOMPUTER TEACHING *STRATEGIES IN VOCATIONAL AGRICULTURE*

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INTRODUCTION

The use of microcomputers in teaching has attracted much attention in recent years. Many studies have been conducted which have attempted to answer questions regarding the use of microcomputers in vocational agriculture (Foster and Miller, 1985; Henderson, 1985; Malpiedi, Papritan and Lichtenstieger, 1985). However, one problem which has not been adequately assessed is the effect of microcomputer-assisted instruction on student achievement. Lacking sufficient evidence to support or refute the use of microcomputers in teaching, many teachers are using microcomputers without justification.

The need for empirical research in the area of microcomputer-assisted instruction was clearly described by Hawley, et al. (1986, p. 1) when they noted, "The future of computing in schools is most probably tied to the microcomputer. Thus research is needed to determine whether microcomputer-based instruction can be educationally effective under typical conditions of use." Henderson (1985) also noted that further research was necessary regarding the use of microcomputers for instructional purposes. Furthermore, she suggested that:

> Research studies, which go beyond the collection of descriptive data, should be conducted to determine the relationship between microcomputer use and educational outcomes. Little empirical evidence exists on the role and value of microcomputers in educational settings. (p. 10)

Foster and Miller (1985) and Malpiedi, Papritan and Lichtenstieger (1985) recently completed survey studies which examined the use of microcomputers by vocational agriculture teachers. In both cases the researchers concluded that microcomputer-assisted instruction was important, however, further research was needed to determine the effect on student achievement.

PURPOSE AND OBJECTIVES

The purpose of this study was to assess the effects of three strategies which incorporated a microcomputer component in teaching vocational agriculture. The three teaching strategies were tutorial, drill-and-practice, and simulation. Each teaching strategy was compared with the other two and a lecture/discussion teaching strategy which has been used in Missouri vocational agriculture programs. The lecture/discussion teaching strategy was designated as the comparison group. This study was designed to fulfill the following objectives:

1. To assess differences in the level of student achievement among the four treatment groups after controlling for pre-experiment achievement differences.

2. To assess differences in student attitudes toward subject matter among the four treatment groups after controlling for pre-experiment attitude differences.

3. To assess differences in the strength of the relationship between student achievement and selected student characteristics among treatment groups.

4. To assess the extent to which any treatment or student characteristic accounted for a significant portion of the variance associated with posttest achievement scores.

PROCEDURES

This study utilized a posttest only, comparison group design to experimentally assess the effect of utilizing microcomputer-enhanced strategies in teaching secondary vocational agriculture. The population defined for this study consisted of 5,784 junior and senior vocational agriculture students in the state of Missouri who were enrolled in a vocational agriculture course in which lessons on soil erosion could appropriately be taught. Using the Krejecie and Morgan (1970) formula for determining sample size and assuming an average of 10 students enrolled per class, it was determined that the experiment should be conducted in 36 vocational agriculture classes to allow the results to be generalized to the relevant population. A cluster sampling technique was used and involved the random selection of 36 vocational agriculture programs which had a minimum of eight students enrolled in an appropriate vocational agriculture class. Students in each selected class were randomly assigned to one of four treatment groups in approximately equal numbers to control for anticipated differences in the effectiveness of individual teachers.

Three microcomputer programs were designed for use in this study to represent the microcomputer teaching strategies to be assessed. The microcomputer programs were written by a graduate student in Agricultural Education at the University of Missouri-Columbia. The programs were examined for content and construct validity by two panels of experts consisting of faculty members in the College of Education and in the College of Agriculture. A field test of the experimental procedures used in the study was conducted in a vocational agriculture program which was not included in the sample.

The study required five consecutive class periods in each selected school. Students in all treatment groups were simultaneously taught the initial lesson focusing on soil erosion by local vocational teachers using lesson plans supplied by the researcher during the first two class periods. At the conclusion of the first lesson, students completed pre-experiment achievement and attitude instruments.

The second lesson was also taught by local vocational agriculture teachers during the third and fourth class periods. Again, treatment groups were taught simultaneously throughout the two-day lesson. However, during pre-determined 20 minute modules, students assigned to each of the microcomputer treatment groups were removed from the regular classroom and allowed to interact individually with a tutorial, drill and practice, or simulation microcomputer program respectively, which constituted the treatment effect. In each case, the microcomputer program was designed to reflect, as closely as possible, the experiences of students in the classroom setting (see Figure 1).

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Review
motivation &
assignment          Supervised          Discussion          Conclusion
                      study
Group
  A------------------------------------------------------------------|

  B-------------------X1---------------------------------------------|

  C------------------------------------X2----------------------------|

  D-------------------------------------------------------X3---------|
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Figure 1

Note: A = Comparison group, B = Tutorial group
C = Drill & practice group, D = Simulation group

At the end of each treatment groups' 20 minute period of interaction with the microcomputer, students returned to the classroom to complete the remainder of the lesson. As noted in Figure 1, the tutorial group was the first to utilize the computer which substituted for the supervised study portion of the lesson. The drill-and-practice group utilized the computer during the first part of the discussion segment of the lesson which involved the calculation of localized Universal Soil Loss Equation (USLE) problems. The simulation group utilized the computer during the latter portion of the discussion segment of the lesson.

At the end of the second lesson all students completed achievement, attitude, and personal data instruments. Data regarding individual student class rank and grade point average (GPA) were collected from guidance counselors in each participating school.

ANALYSIS OF DATA

The data were analyzed to specifically address each of the objectives of the study. The first two objectives were analyzed using an analysis of covariance procedure in which the pre-experiment achievement test score was used as the covariate variable. Correlation coefficients were computed to fulfill the third objective. A Z transformation procedure was employed to identify differences in the strength of the relationship between selected variables among the four treatment groups. The fourth objective was analyzed using a stepwise regression procedure. All statistical procedures and tests were conducted using the .05 alpha level.

RESULTS

A total of 312 students from 31 randomly selected vocational agriculture programs in Missouri provided usable data for analysis. Student absences prevented five selected programs from providing usable data for this study. It was not feasible to repeat the experiment in the selected schools in an attempt to collect data from students who did not provide usable data.

Reliability coefficients were calculated for the two achievement and attitude instruments which were used for data collection purposes. The achievement test instruments produced reliability coefficients of .73 for the pre-experiment test and .76 for the posttest. Coefficient alphas of .98 and .99 were computed for the attitude instrument for the pre-experiment and posttest administrations, respectively.

Table 1 presents results of the analysis of covariance procedure for objective number one and revealed that the pre-experiment achievement test was a significant covariate variable, and when equalized among treatment groups, no differences in group posttest achievement mean scores were identified. Mean achievement scores were 12.17 for the comparison group and 12.89 for the tutorial group on the 17 point posttest.

Table 1. Analysis of Covariance of Posttest Achievement Scores by Treatment Group

Source	DF	SS	F	p
Covariate (pre-experiment achievement score)	1	1279.31	184.05	.001
Treatment	3	24.93	1.20	.312
Error	306	2127.01		
Total	310	3431.25		

Table 2 presents results of the analysis of covariance procedure for objective number two. The test revealed that the covariate variable (pre-experiment attitude score) was significant, and when equalized among treatment groups, no differences in group posttest attitude mean scores were identified.

Correlation coefficients computed to fulfill objective number three are reported in Table 3. Academic rank was found to be moderately associated with the posttest achievement scores of students in the comparison, tutorial, and drill-and-practice treatment groups. However, academic rank was not significantly related to posttest achievement scores of students in the simulation treatment group. The Z transformation did not identify significant differences in the strength of the relationship between academic rank and achievement test scores among any of the treatment groups.

Table 2. Analysis of Covariance of Posttest Subject Matter Attitude Scores by Treatment Group

Source	DF	SS	_F	_p
Covariate (pre-experiment subject matter attitude score)	1	54381.09	359.73	.001
Treatment	3	984.46	2.17	.092
Error	268	40514.15		
Total	272	95879.71		

Table 3. Relationship Between Selected Student Characteristic and Achievement Scores by Treatment Group

Characteristic	Treatment Group				Differing groups
	A[1] n=91	B n=69	C n=73	D n=78	
Academic rank	.385**	.327**	.308**	.199	
Pre-experiment achievement test score	.657**	.528**	.642**	.607**	
Grade level	.018	.147	.066	-.037	
Microcomputer experience	.270**	.273*	.142	-.007	A vs D B vs D
Farm experience	-.165	.372**	.061	.009	
Soil management experience	-.060	.284*	.314**	.243*	A vs C
Gender	-.194	-.016	-.032	-.156	

A[1] = Comparison group; B = Tutorial group; C= Drill & practice group; D = Simulation group

The pre-experiment achievement test scores of students in each of the four treatment groups was found to be positively related to their posttest achievement test scores. Correlation coefficients calculated for the four treatment groups ranged from .53 to .66 and were each significant at the .01 level.

Grade level and student gender were not found to be significantly related to the posttest achievement test scores of students in any of the four treatment groups.

Three characteristics examined were found to exhibit differing relationships among the four treatment groups. Previous microcomputer experience was found to be significantly related to the posttest achievement scores of students in the comparison and tutorial treatment groups but not the drill-and-practice and simulation treatment groups.

Students in the tutorial treatment group who reported having previous farm experience also produced higher posttest achievement scores. The farm experience variable was not found to be related to student posttest achievement scores in the three remaining treatment groups.

Students who reported having previous soil management experience in the tutorial, drill-and-practice, and simulation treatment groups also produced significantly higher scores on the posttest achievement test. However, the soil management experience variable was not found to be related to the student achievement measure for comparison group students.

Treatment groups which were found to differ significantly as a result of the $\underline{Z}$ transformation procedure are also identified in Table 3. Three comparisons were found to differ significantly. The relationship between the microcomputer experience variable and the student posttest achievement measure differed significantly between comparison and tutorial treatment groups and the simulation treatment group. Student performance on the achievement posttest was not related to previous experience with microcomputers for students in the simulation treatment group, whereas, a significant relationship was found between those variables in the comparison and tutorial treatment groups.

There was also a difference in the strength of the relationship between the soil management experience variable and student posttest achievement scores among the two treatment groups. Soil management experience was found to be moderately and positively related to the posttest achievement scores of students in the drill and practice treatment group. However, there was no relationship between those two variables for students in the comparison group.

Table 4 presents the results of the stepwise regression procedure conducted to fulfill the fourth objective of this study. The first variable to enter the prediction equation was the pre-experiment achievement test score variable which accounted for 35.8 percent of the variance associated with the posttest achievement test scores. The second variable to enter the prediction equation was academic rank. This variable, although statistically significant, accounted for less than 2 percent of the variance associated with the posttest achievement test score. Dummy variables for each of the microcomputer treatment effects were included in the pool of potential predictor variables but did not enter the final regression equation.

Table 4. Step-wise Regression Analysis of Posttest Achievement Scores

Characteristic	Step Entered	B	Partial R^2	F	p
Pre-experiment achievement score	1	0.535	.358	142.14	.001
Academic rank	2	0.019	.019	7.77	.006
Intercept = 4.132			Model R^2 = .377		

CONCLUSIONS AND/OR RECOMMENDATIONS

Conclusions and recommendations resulting from this study may be generalized to the population of vocational agriculture students in Missouri from which the sample was drawn. However, these conclusions and recommendations are limited to the specific microcomputer programs and teaching strategies which were used in this study. The following conclusions were developed as a result:

1. Student achievement is essentially equal when taught using the three microcomputer-enhanced teaching strategies as compared with each other or a lecture/discussion teaching strategy.

2. Student attitudes toward the subject matter are not appreciably affected when students are taught using the three microcomputer-enhanced teaching strategies as compared with each other or a lecture/discussion teaching strategy.

3. Previous achievement scores and academic rank are the best predictors of student achievement.

As a result of this study the following recommendations were formulated.

1. Microcomputer-enhanced teaching strategies may be used to supplement or replace a portion of traditional classroom instruction, thus enabling vocational agriculture teachers to spend more time attending to the needs of individual students.

2. Microcomputer-assisted instruction may be effectively utilized in vocational agriculture using tutorial, drill-and-practice, and simulation teaching strategies.

3. Further studies should be conducted to assess the effect of microcomputer-assisted instruction on student achievement over an extended period of time.

4. Additional studies should be conducted to determine if there is a differential effect on student achievement among students of varying academic ability levels when using a microcomputer simulation teaching strategy.

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FACTORS ASSOCIATED WITH THE ACADEMIC SUCCESS OF INTERNATIONAL STUDENTS STUDYING AGRICULTURE IN U.S. INSTITUTIONS

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INTRODUCTION

International training has become an important component of the mission of American Universities. Recent reform movements within education and specifically, higher education have focused upon increasing a positive awareness of the cultural diversity of this nation and it's importance in a global economy, and relatedly, upon increasing a commitment to educating peoples of other nations.

Colleges of Agriculture and Departments of Agricultural Education have recognized the importance of training international scholars as part of their missions. Agricultural Education itself in other nations and other contexts is more broadly defined than the traditional definition used in the U.S. to include all of education about agriculture. As an increasing number of individuals from other nations seek educational programs from U.S. institutions, questions concerning the equitable treatment of the applications of these individuals have arisen. How are records and transcripts from international institutions evaluated and interpreted to determine if an applicant has a reasonable chance of success in an American institution? How may standards for admission be applied to a diverse set of prior educational experiences? Answers to these questions are significant to agricultural education in both a national and an international context.

U.S. institutions which accept international students into graduate programs have had difficulties in properly evaluating the academic performance records of these students (Sentz, 1985). Standards for admission are not easily assessed when compared with unfamiliar measures. Further, many international students come from countries in which the English language is not the native language. In an effort to assist in the assessment for acceptance for graduate study, U.S. personnel who oversee the academic programs of these individuals have often functioned on the assumption that a positive relationship exists between measures such as English proficiency and academic success in graduate study in the U.S.

As Departments of Agricultural Education increase their activities in international training, information on the reliability and validity of assessment measures would be useful to those who are responsible for evaluating the academic records of potential students from educational systems similar to each other but dissimiliar to the U.S. system. These personnel would have greater confidence in determining acceptable standards for admittance into their programs. Personnel from the sending institutions would have like standards on which to base their decisions to send students to U.S. institutions.

The concern associated with predicting the success of students transitioning between education in other countries and advanced education in the U.S. is not one with a single obvious cause. Many interrelated factors may contribute. Adjustment to cultural change when moving from the home country to U.S. society is a commonly accepted phenomenon which affects academic performance. This ability to adapt is seldom considered when making admissions decisions. Morocco is an example of a country where the native language of the participants is difficult from which to make the transition to English. African nations such as Morocco were once French colonies and the educational systems are thus French-speaking. In nations such as Morocco, even the language of instruction (French) may not be completely mastered by the student if the native language of the individual is different (such as Arabic). The educational systems in these nations are often based upon a model which includes the periodic testing of students to remain in the system for advanced study. The assignment of grades within these systems is made on a numerical scale, not always easily interpreted by U.S. university personnel.

PURPOSE and OBJECTIVES

If educational programs from other countries are to function in concert with U.S. based programs, there must be procedures for accurately translating the probability of success between unlike systems of culture and educational experiences. This study sought to describe the level of English proficiency and academic success of selected international students studying at U.S. institutions. It attempted to measure if the relationships between certain measures which are assumed to exist do, in fact, exist. The results are limited to those sets of students whose cultural backgrounds, educational systems and prior experiences are similar to those of these students. The inquiry was guided by several research questions as follows:

1. What is the relationship between the academic performance of students in their home countries and their academic performance as graduate students in U.S. institutions?

2. What is the relationship between the English language ability of these students, as measured by standardized tests, and their academic performances in their home countries and their performances in U.S. institutions?

3. What combination of student characteristics might best predict their likelihood of success in graduate study in the U.S.?

PROCEDURES

The population for the study included all 327 participants of the Minnesota-Morocco project who pursued and completed graduate study in institutions in the U.S. between 1970 and 1985. Since all individuals were included in the study, the study was designated as a census study and population statistics were employed. The term "completion of graduate study" was defined as completing the individualized prescribed programs as determined prior to the commencement of the programs by the project office and their respective undergraduate departments at the Institute Agronomique et Veterinaire (IAV) in Morocco. The types of programs included doctoral and masters level study.

A project advisory committee was established to guide the research. Members of this committee included university faculty members who had advised Moroccan students and had worked with their faculty counterparts in the Moroccan agricultural institute, university training personnel who had assisted in designing academic programs for these students, an associate dean of the graduate school, and a representative of the university admissions office. These individuals served to identify and validate the variables of interest included in the study. The specific variables of interest included:

1. performances on three different standardized measures of English proficiency at the beginning of graduate study including the Test of English as a Foreign Language (TOEFL), the Institutional TOEFL and the Michigan English exam; and scores in English courses at IAV in Morocco;

2. grade point averages earned in course work in U.S. institutions (GPA) and U.S. adviser ratings of student abilities to meet professional expectations;

3. and undergraduate class ranks in Morocco and performances in selected common courses in Morocco.

Inclusion of measures of performance on standardized exams and academic performance can be validated through the literature. The adviser ratings of these students as compared with all other graduate students with whom the adviser had worked was included by the advisory committee because IAV stresses the need for their students to be assessed equally with all other students in all other settings regardless of home country.

Data were collected during the Spring and Summer of 1986 from the permanent records of the University of Minnesota International Agriculture Programs Office and the records offices of IAV in Morocco. A simple recording sheet served as the data collection instrument. Since the data were of a factual nature and were collected from the permanent records of the respective institutions, instrument validity and reliability were not of concern to the study. Recorder reliability was monitored by the periodic verification by a second party to insure the correct recording of data. The researcher traveled to Morocco to begin the data collection process and to train a Moroccan counterpart in the collection of the necessary data.

The data were summarized and descriptive statistics were utilized to address specific research questions in the study. Pearson Product-moment correlations were calculated to determine relationships between variables of interest and are reported herein.

RESULTS

Table one indicates that moderate to substantial positive correlations were found to exist between several variables of interest. However, as significant a finding was the lack of strong correlations previously assumed to exist between several variables of interest.

Pearson product-moment correlation values described as "substantial," using Davis' (1977) adjectives for describing correlations, were found between measures of English ability. When the TOEFL scores were correlated with the Michigan English exam and the Institutional TOEFL, correlations of .61 and .53, respectively, were found. A moderate correlation (.34) was found between the Institutional TOEFL and the performance of Moroccan students in English class in Morocco. Moderate relationships were found between academic performance in U.S. institutions, as measured by grade point average, and performance on the TOEFL and the Michigan English exam (.34 and .39, respectively). The general academic abilities and the abilities to conceptualize when compared with other graduate students as rated by the academic advisers of these students were moderately related to

English ability as measured by the Institutional TOEFL (.40 and .46, respectively).

Moderate to substantial relationships were recorded between several of the yearly Moroccan class ranks, a measure widely used as a predictor of success abroad. Correlations between rank in year four and performance in core animal and vegetable classes in Morocco were found (.40 and .38, respectively). However, only in year four of Moroccan class rank was a moderate correlation found with academic performance in the U.S., as measured by U.S. grade point average (.30).

A very strong relationship (.84) was found between the students' abilities to conceptualize and their academic ability, as rated by their academic advisers in the U.S. These measures, previously unvalidated, were presumed by the project advisory committee to be reliable predictors of success in graduate study. Their rated academic ability and ability to conceptualize were each moderately correlated with U.S. grade point average (.38 and .31, respectively).

Negligible to low correlations were found between scores on standardized English exams and class ranks in Morocco (.11 to .29). While a moderate relationship was found between Institutional TOEFL and the two adviser ratings of student abilities, negligible to low correlations were found between these ratings and the TOEFL and the Michigan English exam.

CONCLUSIONS

The findings indicated that for these international students their performances on measures of English proficiency were more highly correlated with success in graduate course work in U.S. institutions than was their prior performance in undergraduate-level programs in their home country. Our present admissions systems assume that among students for whom English is not their native language an acceptable level of ability in English is required. However, little evidence exists to indicate that beyond a minimum level of English ability, this level of ability might be used to predict performance in course work; that once a student is admissible to graduate study in a U.S. institution possessing a certain level of English ability, that level of ability could be used to predict the likelihood of success in graduate course work.

Another common assumption used in making graduate program admissions decisions is that performance in previous course work is highly correlated with performance in graduate courses. This was not found to be true when Moroccan undergraduate-level course work was correlated with U.S. graduate grade point averages. This would indicate that analyses of undergraduate performances in the home country institution were not good indicators of probable success in graduate programs in U.S. institutions.

English scores were, however, among the variables most highly associated with U.S. academic success, as were ratings by U.S. advisers. Each of these measures was moderately associated with graduate grade point average.

These findings have important implications for the process of admitting international students to graduate study in Agricultural Education. These findings indicate that for the students included in this study, level of English speaking ability was at least as, if not more important than prior performance in college-level course work in their home country. Should graduate admissions standards continue to expect only a minimum level of English proficiency but have performance in course work in the home country as the major factor on which to make the admissions decision? Further study needs to be done with populations of students from the same country sufficiently large to allow for analyses.

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Table 1

Pearson Product-Moment Correlations Between Selected Variables

	TOEFL	Mich. Engl.	Inst. TOEFL	Mor. Engl.	Rank Yr.1	Rank Yr.2	Rank Yr.3	Rank Yr.4	U.S. GPA	Ad.Rt. Ac.Ab.	Ad.Rt. Concp.	Mor. Biom.	Mor. Anim.	Mor. Veg.
Mich. English	.61	1.00												
Inst. TOEFL	.53	.44	1.00											
Morocco Engl.	.18	.08	.34	1.00										
Mor. Class Rank 1	.25	.11	.26	.15	1.00									
Mor. Class Rank 2	.25	.26	.29	.08	.40	1.00								
Mor. Class Rank 3	.28	.23	.25	.06	.34	.65	1.00							
Mor. Class Rank 4	.22	.18	.29	.15	.33	.54	.51	1.00						
U.S. Grade Average	.34	.39	.09	.00	.03	.24	.20	.30	1.00					
Adviser Rating-Academic Ability	.21	.17	.40	.03	.08	.27	.14	.21	.38	1.00				
Adviser Rating-Conceptualize	.17	.14	.46	.02	.02	.21	.09	.22	.31	.84	1.00			
Mor. Biometry	.05	.11	.07	.06	.27	.24	.04	.26	.15	.22	.28	1.00		
Mor. Animal Prod.	.12	.08	.02	.13	.09	.13	.16	.40	.29	.20	.17	.32	1.00	
Mor. Vege. Prod.	.08	.06	.11	.20	.25	.35	.26	.38	.21	.20	.17	.36	.38	1.00

N = 327

JOB SATISFACTION OF 4-H AGENTS
OF THE COOPERATIVE EXTENSION SERVICE

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INTRODUCTION

"Extension's fundamental objective is the development of people by means of educational programs. Generally, this objective includes helping people acquire knowledge, solve problems, make sound economic decisions, and plan for the future" (Smith-Lever Act, 1914). The purpose of the Cooperative Extension Service, as stated in the original legislation, is "to aid in the diffusing among the people of the United States useful and practical information on subjects relating to agriculture and home economics and to encourage the application of the same" (Smith-Lever Act, 1914). Therefore, extension work is an "out-of-school" system of educational responsibilities in the fields of agricultural production; marketing and distribution; all fields of home economics; leadership development; community improvement; public affairs; farm and home management; conservation of natural resources; and citizenship. The 4-H club program is the youth phase of the off-campus extension educational program.

Capable and productive personnel are essential for organizational efficiency. Providing capable personnel is a part of recruitment and selection. The development of selected personnel is dependent on several other processes. An individual's inherent capabilities are determined by his heredity, but his actual level of development is determined by his education, training, experiences, and motivation which are functions of his environment. Although other factors are involved, many feel that performance is primarily a function of ability times motivation (Fugler, 1974, p. 4).

The ability side of the equation is provided for through continued analysis of the agent's knowledge and skill needs, and satisfying these needs through varied educational and training experiences. On the motivational side, it is desirable and necessary to have workers satisfied with their jobs. There is general agreement that human behavior, in general, and the motivation to work, in particular, center around the desire for need satisfaction. Therefore, the ability of extension administrators and supervisors to correctly identify areas of job satisfaction, estimate psychological need deficiencies of agents, make job adjustments, and correctly choose incentives is the ultimate key to increased motivation, job satisfaction, and productivity (Fugler, 1974).

PURPOSE AND OBJECTIVES

The purpose of this study was to determine the job satisfaction of Louisiana Cooperative Extension Service 4-H agents and to determine the relationship between selected demographic characteristics and their level of job satisfaction.

Specific objectives formulated to guide the researchers included:

(1) To determine the job satisfaction of Cooperative Extension Service 4-H agents based on intrinsic, extrinsic, and general satisfaction scores as identified by the "Minnesota Satisfaction Questionnaire."
(2) To describe Cooperative Extension Service 4-H agents on selected personal and professional demographic characteristics.
(3) To determine if a relationship exists between the job satisfaction and selected demographic characteristics of Cooperative Extension Service 4-H agents.

PROCEDURES

Population and Sample

The target population of this study was 4-H agents of the Louisiana Cooperative Extension Service. The frame for the study was identified using the August, 1986 Louisiana Cooperative Extension Service Personnel Directory.

The sampling plan for the selection of 4-H agents for participation in this study utilized a proportional, stratified random sample to make sure that 4-H agents in each geographical region of the state would be represented in the sample. A random sample of 75 4-H agents was drawn from a total of 135 4-H agents eligible for participation in the study. Cochran's Sample Size Formula was employed to determine that a minimum of 54 responses were needed for the study.

Instrumentation

Two instruments were used in the collection of data for this study. One instrument was used to measure job satisfaction, and the other to collect demographic data.

A variety of instruments have been designed to measure job satisfaction. The instrument selected was the "Minnesota Satisfaction Questionnaire" (MSQ), developed by Weiss, Davis, England, and Lofquist (1967).

There are two forms of the "Minnesota Satisfaction Questionnaire," the MSQ Long-Form, and the MSQ Short-Form. The researchers selected the MSQ Short-Form for use in this study. The MSQ Short-Form measures intrinsic, extrinsic, and general job satisfaction.

The second instrument used was a demographic information questionnaire to determine factors such as age, sex, job tenure, job title, and educational background.

Data Collection

The data included in this study were collected by mailed questionnaires. The MSQ and Demographic Questionnaires were mailed to the selected sample along with a cover letter explaining the study and requesting participation. A stamped, self-addressed envelope was also enclosed for the return mailing. Two weeks after the initial mailing, nonrespondents were telephoned to remind them of the study and to ask for their participation. Approximately one week after the telephone calls, nonrespondents were sent a second letter and copy of the questionnaire.

After the second mailing and telephone reminders, 73 out of 75 responses were received for a 97.33% response rate.

DATA ANALYSIS AND RESULTS

DESCRIPTION OF RESPONDENTS

Years as a 4-H Agent

The respondents indicated how many years they had been a 4-H agent. Thirty (41.10%) had been 4-H agents from three to six years; seventeen (23.30%) had been 4-H agents less than three years, fourteen (19.17%) had been 4-H agents more than ten years; and twelve (16.43%) had been 4-H agents seven to nine years. The average length of service was 6.40 years with a standard deviation of 4.18 years.

Technical Area of Preparation

The 4-H agents were asked to indicate their technical area of preparation. Twenty-six respondents (35.62%) held the bachelor's degree in vocational home economics. Nineteen respondents (26.03%) held a bachelor's degree in animal science, and the twenty-eight remaining respondents (38.36%) held bachelor's degrees in some other area of agriculture or home economics. (See Table 1)

Of the respondents, 40 (54.78%) held master's degrees in some area of agriculture or home economics and 33 (45.22%) reported the bachelor's degree as their highest level of education.

Table 1
Respondents' Technical Area of Preparation

Technical Area	N	Percent
Vocational Home Economics Education	26	35.62
Animal Science	19	26.03
Other Technical Area	9	12.33
Vocational Agricultural Education	6	8.22
Family Life and Environment	5	6.85
Agricultural Economics	3	4.10
Foods and Nutrition	2	2.74
Agronomy	1	1.37
Horticulture	1	1.37
Clothing and Textiles	1	1.37
Total	73	100.00

Official Job Title

Regarding the official job titles of the participants, 20 (27.40%) listed their job title as Associate County Agent (4-H), and 19 (26.03%) were Associate Home Economists (4-H). The least frequent job title among the respondents was County Agent (4-H), with three (4.10%) holding that job title. (See Table 2)

Table 2
Official Job Title of Respondents

Official Job Title	N	Percent
Associate County Agent (4-H)	20	27.40
Associate Home Economist (4-H)	19	26.03
Assistant County Agent (4-H)	13	17.81
Assistant Home Economist (4-H)	9	12.33
Home Economist (4-H)	9	12.33
County Agent (4-H)	3	4.10
Total	73	100.00

Preference of Making 4-H A Career Role or Preference of A Position Working With Adults

The respondents were queried as to whether they preferred making 4-H work a career role or if they preferred a position working with adults. The researchers received 71 answers to this question. Of the 71 responses, 27 4-H agents (38.03%) indicated they would prefer making 4-H a career role; while 44 respondents (61.97%) indicated that they would like a position working with adults.

Number of Hours Worked Beyond 40/Week

When asked how many hours beyond 40 did they typically work each week, 72 out of 73 respondents provided usable data. Twelve respondents (16.66%) stated they worked 10 hours beyond 40 hours per week. Eleven respondents (15.27%) worked 8 hours beyond 40 hours per week. Eight respondents (11.11%) said they worked less than five hours beyond 40 hours per week, and nine respondents (12.50%) said they worked 21 or more hours beyond 40 hours per week. (See Table 3)

Table 3
Hours Worked Beyond 40/Week

Number of Hours	N	Percent
0 - 5	8	11.11
6 - 10	26	36.12
11 - 15	13	18.05
16 - 20	16	22.22
21 +	9	12.50
No response	1	-
Total	73	100.00

Sex

Of the 73 4-H agents responding to the questionnaire, 35 (48%) were male and 38 (52%) were female.

Age

Sixty-six out of 73 respondents reported their age. Ages ranged from 24 years old to 48 years old. Average age of 4-H agents was 32.5 years of age, with a standard deviation of 5.9 years.

JOB SATISFACTION OF RESPONDENTS

The most meaningful scores to use in interpreting the MSQ are the percentile scores for each scale obtained from the most appropriate norm group. The appropriate norm group for an individual is one that corresponds exactly to his job. At the present time, however, the number of norm groups for use with the MSQ Short-Form is limited; therefore, it was necessary to select a similar norm group.

The norm group selected was professional, technical, and managerial engineers. The reason this group was selected is that 4-H agents are professional people. They teach technical subject matter in agricultural- and home economics-related fields; and they manage or conduct the 4-H Club programs which encompass a wide variety of subjects, projects, and activities. The 4-H agents and engineers are similar in educational requirements, type of supervision, and physical working conditions. It was for these reasons that the professional, technical, and managerial engineer norm group was chosen as the group most similar to 4-H agents. Other norm groups to choose from included office clerks, salesmen, janitors and maintenancemen, machinists, assemblers, and electrical assemblers.

In interpreting the results of the MSQ, it is recommended that a percentile score of .75 or higher be considered a high degree of satisfaction. A percentile score of .25 or lower represents a low level of satisfaction. Scores in the middle range of percentiles, .26 to .74, indicate a moderate level of satisfaction (Weiss, et al, 1967).

General Satisfaction

Table 4 indicates that approximately 40% of the 4-H agents surveyed reflected general satisfaction scores falling in the 70's. General satisfaction scores had a range of 30 to 98. The majority of 4-H agents (49 or 67.12%) reflected a general satisfaction score between 60 and 80. The mean score was 71.15. When compared to the selected norm group, the 4-H agents' general job satisfaction score fell at the 23rd percentile, indicating a low level of general satisfaction. The lowest score reported was 31, which fell into the second percentile. Two agents reflected scores more than 90 that fell into the 90th percentile. Of those responding, three (4.1%) were at the high satisfaction level, 34 (46.6%) were at the moderate satisfaction level, and 36 (49.3%) were at the low level of general satisfaction.

Intrinsic Satisfaction

Scores on intrinsic satisfaction are presented in Table 5. Intrinsic satisfaction scores had a possible range of 16 to 60. The largest groups of 4-H agents (36 to 49.31%) scored between 40 and 49 on intrinsic satisfaction. The mean score was 47.55. Comparisons to the norm group revealed that the mean intrinsic satisfaction score fell at the 37th percentile, indicating a moderate level of intrinsic satisfaction among 4-H agents. The lowest score reported was 18, which fell into the second percentile. One agent reported a score of 60, which fell into the 99th percentile. Of those responding, 15 (20.6%) were at the high satisfaction level, 38 (52%) were at the moderate satisfaction level, and 20 (27.4%) were at the low level of intrinsic satisfaction.

Table 4
General Job Satisfaction Scores of Respondents

Score Category	N	Percent
30 - 39	2	2.74
40 - 49	0	0.00
50 - 59	7	9.59
60 - 69	20	27.40
70 - 79	29	39.73
80 - 89	13	17.80
90 - 100	2	2.74
Total	73	100.00

Table 5
Intrinsic Job Satisfaction Scores of Respondents

Score Category	N	Percent
10 - 19	1	1.37
20 - 29	1	1.37
30 - 39	5	6.85
40 - 49	36	49.31
50 - 59	29	39.73
60	1	1.37
Total	73	100.00

Extrinsic Satisfaction

Scores of 4-H agents' extrinsic satisfaction are shown in Table 6. Extrinsic satisfaction scores had a possible range of 6 to 30. Twenty-seven agents (37%) had scores in the 15-19 range category. Mean score on extrinsic satisfaction was 16.63. The 18th percentile was determined to be where the mean score was located, indicating a low level of extrinsic satisfaction among 4-H agents. The lowest score reflected on extrinsic satisfaction was six, which was at the first percentile. Two agents reported high scores of 26 and 30, which fell into the 90th and 99th percentiles, respectively. Of those responding, two (2.8%) were at the high satisfaction level, 32 (43.8%) were at the moderate satisfaction level, and 39 (53.4%) were at the low satisfaction level of extrinsic satisfaction.

ASSOCIATIONS BETWEEN SATISFACTION AND SELECTED DEMOGRAPHIC CHARACTERISTICS

Objective three was to secure information on 4-H agents' intrinsic, extrinsic, and general job satisfaction levels as related to selected

Table 6
Extrinsic Job Satisfaction Scores of Respondents

Score Category	N	Percent
6 - 9	4	5.48
10 - 14	20	27.39
15 - 19	27	37.00
20 - 24	20	27.39
25 - 29	1	1.37
30	1	1.37
Total	73	100.00

demographic variables. Demographics selected for analysis included years as a 4-H agent, hours worked beyond the normal work week, official job title, technical area of preparation, sex, and age.

The Pearson Correlation Coefficient was used to determine the relationship between the intrinsic, extrinsic, and general job satisfaction scores and the demographic characteristics of years employed by the Cooperative Extension Service, hours worked beyond the normal work week, and age.

The only relationship that was found to be significant ($r=.25$) was intrinsic job satisfaction as related to the demographic characteristic years employed by the Louisiana Cooperative Extension Service ($p < .05$). The relationship found was a low positive association.

The One-Way Analysis of Variance procedure was used to compute the differences in general, intrinsic, and extrinsic job satisfaction of 4-H agents among the levels of the demographic variables of their technical areas of preparation and their official job title.

No statistically significant differences on job satisfaction were found between the groups at the .05 level in the area of technical area of preparation. However, on the variable job title, significant F values indicating one or more differences were found on general, intrinsic, and extrinsic satisfaction scores.

The Tukey's post hoc multiple comparison procedure was used to determine where these differences occurred. On general job satisfaction, the group Associate County Agent was found to be significantly lower (mean=63.80) than the group County Agent/Home Economist (mean=77.42).

On Intrinsic Satisfaction, the same two groups, Associate County Agent (mean=43.85) and County Agent/Home Economist (mean=53.00) were found to be significantly different. However, when extrinsic satisfaction was compared, the group Associate County Agent (mean=13.50) was found to be significantly lower than several other groups including: Assistant County Agent (mean=18.23), County Agent/Home Economist (mean=17.83) and Associate Home Economist (mean=17.58).

The t-test procedure was used to determine the difference in general, intrinsic, and extrinsic satisfaction scores among the levels of the demographic characteristic of sex. Findings revealed that on general satisfaction, the mean score for women was 73.90 while responding men agents had a mean score of 68.17 ($t_{(71)}=2.26$, $p<.05$).

Women agents also had higher scores on intrinsic satisfaction ($\bar{x}=49.18$) than did men ($\bar{x}=45.77$), $t_{(71)}=2.15$, $p<.05$. In addition, the extrinsic satisfaction scores for women ($\bar{x}=17.92$) were higher than those for men ($\bar{x}=15.23$), $t_{(71)}=2.74$, $p<.05$.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

Findings of the study served as the basis for the following conclusions:

(1) The majority of 4-H agents surveyed would prefer to move into a role of adult extension work.
(2) The majority of 4-H agents typically work more than 50 hours per week.
(3) Associate County Agents are less satisfied with their work than are the other groups of 4-H agents.
(4) Women 4-H agents are more satisfied with their jobs than men 4-H agents.

RECOMMENDATIONS

The findings and conclusions of the study lead to the following recommendations:

(1) Extension Administrators examine the possibility of establishing flexible in-office schedules for their employees in order for them to better organize their work and family lives.
(2) As tenure increases and the certain educational requirements are met, standardized pay scales or step increases be developed and met, if funds are available, to increase self-image and hopefully improve job satisfaction levels of Associate County Agents.
(3) An intensive study be conducted to attempt to determine, specifically, the factors that influence Associate County Agents (4-H) to be the least satisfied group in the Louisiana Cooperative Extension Service.

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QUALITATIVE RESEARCH: IMPLICATIONS FOR AGRICULTURAL EDUCATION RESEARCH

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INTRODUCTION

- o Historical and contemporary commitment to research in agricultural education
- o General context for agricultural education research

IMPORTANCE OF AND NEED FOR RESEARCH IN AGRICULTURAL EDUCATION

- o Basis for program improvement
- o Basis for maintaining excellence
- o Basis for program re-direction
- o Basis for program accountability and justification

CURRENT RATIONALE AND PRACTICE IN AGRICULTURAL EDUCATION RESEARCH

- o A scientific treatment of agricultural education research
  - Positivism
- o An economic view of agricultural education research
  - Human capital theory
- o Agricultural education research practices
  - Research criteria
  - Functions of research
  - Objects of research
  - Methods of research
- o Conclusions about current rationale and practice in agricultural education research
  - Nature of reality

  - Relationship of knower to the known
  - Generalization
  - Causal linkages
  - Role of values

CONCERNS ABOUT AND CHALLENGES TO CURRENT RESEARCH PARADIGM IN AGRICULTURAL EDUCATION

- o Overreliance on empirical-analytic perspective
- o Expert domination of research framework
- o Insufficient consideration of context
- o Overemphasis on separate and discrete outcomes
- o Managerial orientation of research framework
- o Inadequate conceptualization of what science is
- o Lack of attention to humanness of human research subjects

AN ALTERNATIVE PARADIGM, ENROUTE TO QUALITATIVE METHODS

- o Theoretical foundation
  - Phenomenology
  - Symbolic interaction
  - Culture
  - Ethnomethodology
- o Contrasting beliefs
  - Nature of reality
  - Relationship of knower to the known
  - Possibility of generalization
  - Possibility of casual linkages
  - Role of values

CHARACTERISTICS OF QUALITATIVE RESEARCH

- Source of data comes from natural setting
- Researcher is the key instrument
- Vivid descriptions are provided
- Process is important along with outcomes and products
- Theory is developed from bottom up rather than top down
- Concern with stakeholder perspectives

THE METHODS OF QUALITATIVE RESEARCH

- Observation
- Interviewing
- Document/record review
- Data collection, analysis, and reporting
- Reporting content and quality of the effort

THE CHALLENGE FOR AGRICULTURAL EDUCATORS

- Understanding the substantive (agricultural education) paradigm
- Understanding appropriate research paradigms
- Legitimizing alternative viewpoints and practices